(c) The Bay-Bloor-Yonge area, which has excellent subway service, is not exempt from the parking provisions of the zoning by-law. The parking provided in compliance with the zoning will be used primarily for all-day parking. Conversely, the City has decided to convert a Parking Authority lot in this area, used primarily by short-term parkers, into a park.

(d) A City program to provide free or reduced rate on-street parking in residential areas is likely to encourage greater automobile ownership, thereby increasing the severity of the parking problem.

2. Land Use - The parking exemption in the Core has encouraged the development of numerous small and, in some cases, temporary commercial lots. This situation is changing as land values escalate and major redevelopment occurs. Current by-laws and licensing regulations do not encourage orderly planning of Core area parking. Conversely, the policy adopted by the City and the Toronto Parking Authority for areas outside the Core where private developers must provide parking on site or contribute to a parking fund better enables the municipality to plan parking and coordinate it with adjacent land uses.

3. Environmental - The provision of an adequate supply of suitably-located parking is an environmental advantage. Vehicles create few problems when they are parked. Noise, fumes, and pedestrian conflicts are much more likely when vehicles are unable to park and must keep circulating to find alternative parking sites. Moreover, large facilities are generally more efficient and less unsightly than small ones.

The Toronto Parking Authority and other major parking operators generally attempt to make their above-ground facilities visually unobtrusive. The trend to structured parking, and especially underground or integrated structures, further reduces the visual evidence of parking in the central area. Similarly, large facilities with well-planned access routes disrupt pedestrian flows much less than many small lots with numerous entrances and exits.

4. Safety - Pedestrian safety is a major community con-concern. Numerous driveways providing access to scattered downtown parking facilities are not conducive to safe pedestrian movement, especially where sidewalk flows are heavy. While this does not appear to present a serious hazard, the consolidation of access points will benefit both pedestrians and drivers. Illegal curb parking along major downtown arterial streets creates hazards for both pedestrians and drivers. Conflicts between moving vehicles and those parking or unparking disrupt the orderly flow of traffic and can create unnecessary dangers for pedestrians.

5. Costs/Revenues - A major portion of the community's revenues are used for parking purposes. However, payments resulting from parking fines may be used for other purposes. The policy of buying land for peripheral Core lots and then selling this land for major developments which will themselves be major traffic generators may not be the most economical solution for the municipality.

   In residential areas which lack an adequate supply of off-street parking, the fees from curb parking permits are accumulated in a residential parking fund. Net revenues from this fund will be used to open new rear-lot public lanes and provide other types of off-street parking.

6. Enforcement - From the standpoint of the community and the citizen, the employment of Parking Control officers to replace regular Police Officers is a definite improvement. This move will upgrade the image of the regular officers and allow them to concentrate on more important functions. The community's parking policies require efficient enforcement of curb parking regulations, especially in the Core. A recent survey indicates a relatively high incidence of illegal curb parking, with taxis and trucks accounting for a disproportionate percentage of the offenders. The community is applying stricter enforcement measures where illegal on-street parking is a recurring problem.

   The non-enforcement of curb parking regulations on specified residential streets in the City is discriminatory. Moreover, it is a stop-gap measure which, in the long run, can substantially worsen the residential parking problem by encouraging increased vehicle ownership.

Every year brought spring . . ..

... and every year . . . [it] had lain asleep under the snow for four months, offered men its fields to plough and harrow and fertilize and seed and harvest . . .;

... different men ...

... but always the same land.

From Ringuet,
Thirty Acres

AGRICULTURAL LAND-USE CHANGE IN CANADA:

PROCESS AND CONSEQUENCES

by

J.D. McCuaig
E.W. Manning

Lands Directorate
Environment Canada

Ottawa
January 1982

LAND USE IN CANADA SERIES

The *Land Use In Canada Series* is designed to address current land-use issues and problems in Canada. The series, produced by and for the Lands Directorate of Environment Canada, examines the causes and consequences of major land-use problems and trends throughout Canada and assesses the role of various government programs in eliciting solutions.

Incorporating the earlier series entitled *Land Use Programs in Canada*, the series provides a national perspective of activities affecting the use of Canada's land.

Editing and Format: Maret Liivamae

Cartography: Environmental Conservation Service, Drafting Division

Typesetting: Supply and Services Canada, Canadian Government Printing Office

Cover Photo: R. B. Clement's "Blue Spring Farm," in Bruce County, Ontario. In *Illustrated Atlas of the Dominion of Canada*, 1881.

Frontispiece: A farm in Lanark County, Ontario
E. W. Manning

Authors: James D. McCuaig, MA (Geography), is Chief of the Land Planning Analysis Division, Lands Directorate, Environment Canada.

Edward W. Manning, PhD (Geography), is Chief of the Land-Use Analysis Division, Lands Directorate, Environment Canada.

Cat. No. 73-1/21E

ISBN 0-662-11785-9

PREFACE

The nation's farmland is important to Canadians not only for food but for much of our export wealth. What happens to that farmland should therefore be of considerable concern to all Canadians. During the past decades, substantial changes have been taking place in the use of this most vital resource. Canada has many fewer farms and farmers than in the past and, in many parts of the nation, farmland lies idle. Other areas of Canada, principally in the west, have seen major advances of agriculture into areas never previously under the plow. But these are only the symptoms of major alterations in the use, management, and productivity of our farmland base.

This publication is a result of the Land Use Research Program of the Lands Directorate and is designed to provide Canadians with a national perspective on their farmland resource and what is happening to it. The paper not only describes what changes are taking place, but also examines how these changes are produced and how individuals and governments influence the present and future use of this national resource. It is important for Canadians to recognize that what is done now to exacerbate or avert problems will affect the living standards of future generations.

R.J. McCormack
Director General
Lands Directorate

ABSTRACT

Agricultural land is one of Canada's most important natural resources, yet there has been insufficient information for an overall understanding of what is happening to this resource. The objective of this paper is to analyze changes in the use of agricultural land from a national perspective and from the specific focal point of a region where the processes of agricultural land-use change can be isolated.

The use of a new data set developed from census data sources permits a detailed analysis of agricultural land-use change in 229 regions of Canada over the fifteen-year period from 1961 to 1976. Maps and tables derived from this data source show the nature and extent of regional changes in the use of agricultural land. A major westward shift of farming in Canada has been accompanied by greater intensification of cultivation on the best land and abandonment of the land less suited to intensive agricultural production. Farms are generally getting larger and more heavily capitalized. Regional differences are placed in a national context by means of a framework classifying the 229 separate areas into four categories: agricultural heartland, advancing frontier, retreating margins, and urban fringe.

The causes of the changes evident from the data are analyzed through a field study area. The Saugeen Valley of Ontario was selected because it exhibits characteristics of change similar to the national and eastern heartland norms. By means of the case study, it was possible to examine the various factors that have compelled farmers to capitalize and intensify, to remain the same and lose their viability, or to begin a gradual withdrawal from farming. While individual willingness and ability to change were significant in determining the nature of land-use decisions, ability to enlarge through capitalization was the most important factor separating those who expanded or intensified their enterprise from those who left farming in whole or in part.

The paper concludes that the accumulated individual decisions of landowners add up to the national land-use pattern. Because of the demonstrated importance of the individual landowner, it is at this level that any attempts to alter the way in which farmland is used must be directed.

RÉSUMÉ

Les terres agricoles sont l'une des plus importantes richesses naturelles au Canada. Cependant, on manque d'information pour bien saisir ce qu'il advient de cette ressource. Le présent article analyse les changements qui se produisent dans l'utilisation des terres agricoles à l'échelle du pays et aussi dans une région en particulier: la vallée de la rivière Saugeen, en Ontario.

Cette recherche spécifique s'inscrit dans une analyse détaillée d'un nouvel ensemble de données de recensement pour 229 régions du Canada. La période est de 15 années, soit de 1961 à 1976. Des cartes et des tableaux dressés à partir de ces informations montrent bien la nature et l'étendue des changements. Un important déplacement de l'agriculture vers l'ouest du Canada s'est accompagné d'une intensification de l'exploitation des meilleures terres et de l'abandon des terres qui se prêtent moins bien à la culture intensive. Règle générae, les fermes s'agrandissent et exigent des immobilisations importantes de capitaux. Pour marquer les différences régionales à l'échelle nationale, on classe les 229 régions en 4 catégories: fonds de terres agricoles, nouveaux territoires exploités, territoires en recul et périphérie urbaine.

On analyse les causes de changements révélés par les données au moyen d'une étude portant sur une région en particulier. Le site choisi présente des caractéristiques de changement qui correspondent aux normes applicables aux fonds de terres agricoles à l'échelle nationale et dans l'est du pays. Grâce à l'étude de cas, on a pu analyser les différents facteurs qui ont amené les agriculteurs; a) à investir dans leur ferme et les faire croître; b) à demeurer stables et à perdre leur rentabilit; ou c) encore à commencer à se retirer graduellement du domaine. La volonté et les capacités personnelles de changement ont grandement joué sur les décisions concernant l'utilisation des terres, mais, la possibilité d'investissement financier a été le facteur déterminant entre ceux qui ont agrandi ou intensifié leurs activités et ceux qui ont abandonné l'agriculture partiellement ou complètement.

L'auteur du document conclut que les décisions de chaque agriculteur et propriétaire viennent s'ajouter aux autres éléments qui déterminent l'utilisation des terres. Compte tenu de l'importance manifeste de chaque propriétaire, c'est précisément à ce niveau qu'il faut tenter de modifier les tendances en matière d'utilisation des terres.

SPECIAL CONTRIBUTORS

JANE PELTON—Jane served as principal research assistant during the final analysis and writing phase of the paper. Her contributions in data analysis, checking, and formatting and her considerable efforts in seeking data sources, documentation, and supporting information were significant in the successful completion of the research. Jane carried out much of the investigation and preparation of the anecdotal inserts and located information from statistical and archival sources to help with the hypothesis testing. She also handled the logistics of preparation of the maps and graphic materials. Jane's enthusiasm was a real asset to the project team and helped considerably during the hard going.

ILZE REISS—Ilze managed the coding, review, and processing of the questionnaire responses from the Saugeen study and conducted much of the initial analytical work on questionnaire responses. Her diligent work in collating large numbers of questionnaires and in formatting and testing the case-study data was central to the analysis of this data and to the development of many of the frequency distributions and contingency tables upon which Chapters 4 through 6 are based.

PAT DOSSETT—Pat handled the development of the national data set from census sources. She managed the data allocation program, the testing of a working program that could accommodate all the boundary changes and the time series in SPSS, and the generation of new derived variables from the data sources. She also checked the initial data to ensure that the system was working and accurate. Pat's operation of the data set made the national overviews possible.

ACKNOWLEDGEMENTS

A study of this magnitude is not possible without the help and encouragement of many people. The indispensible contributions of three research assistants, Jane Pelton, Ilze Reiss, and Pat Dossett, are separately acknowledged. The authors are also indebted to the field interviewers, David Keuhner, Phyllis Hammell, Leo Tervitt, Ken Westman, Dave Pybus, and Jim Coffey, and to the landowners of the Saugeen who were so hospitable and forthcoming. Carole Louiseize was responsible for transferring the census figures into the national data set. Del Coleman carried out the 1976 land-use mapping in the Saugeen, and Bill Bungall provided a summary of infrastructural changes.

The work of the Environmental Conservation Service drafting shop was essential in the preparation of the charts, maps, and graphs in this study. The Canada Land Data System staff were of particular assistance in producing the overlays necessary for analysing land-use change in the Saugeen and for developing the national data set.

The authors are indebted to Paul Bircham, Wayne Bond, Wendy Simpson-Lewis, and Lee Munn of the Policy Research and Development Branch for their critiques of the drafts and many suggestions for improvement. The assistance of Paul Rump, Dave Gierman, and Jennifer Moore of the Canada Land-Use Monitoring Division in clarifying some of the interpretations of land-use change and relating them to other data was also invaluable. The suggestions and encouragement of Lorne Russwurm, of the University of Waterloo, when writing the final drafts were of considerable value in providing important focal points. Last, but certainly not least, were the excellent work of our editor Maret Liivamae and our typist Carole Aubin-Lalonde in preparing the manuscript for publication.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

A rural lifestyle in the urban fringe of Waterloo, Ontario.
P.D. Bircham

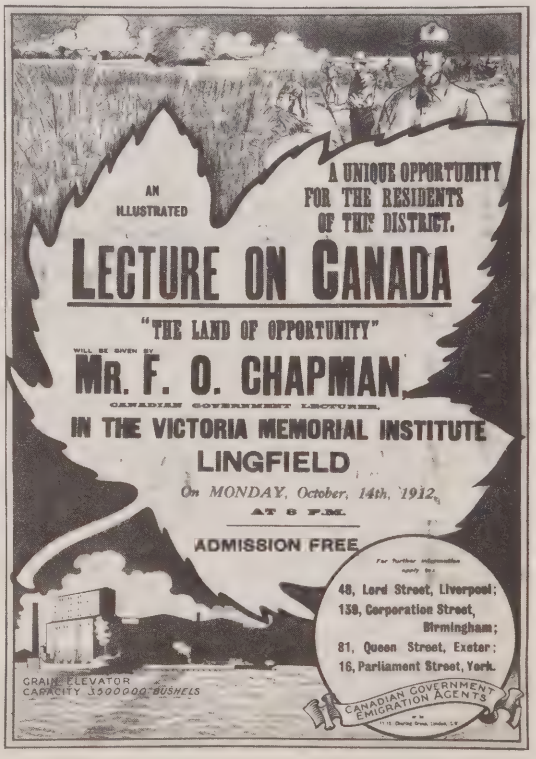
A farming community in Victoriaville, Quebec.
Pierre Gaudard, NFB Phototheque

Chapter One


Lees dit!
Het Beste Tarweland
en Weideland der
Wereld.
64
Hectaren
in
Manitoba
en groote Noord Westen
AMERIKA.
10 dagen
van Holland.
Beschrijvingen,
kaarten en verdere
inlichtingen worden
kosteloos verstrekt door


FREE FARMS FOR THE MILLION
DOMINION OF
CANADA
Red River Valley
The Great Fertile Plains
and British Columbia
Immense Coal Fields.
Climate the Healthiest in the World.
5 Experimental Farms
FREE FARMS OF 160 ACRES
MANITOBA, CANADIAN NORTH-WEST AND BRITISH COLUMBIA
VAST COAL FIELDS AT CONVENIENT DISTANCES.
GRANTS FROM 100 TO 200 ACRES ARE OFFERED IN OTHER PARTS OF CANADA.
HIGH COMMISSIONER FOR CANADA,
DEPARTMENT OF THE INTERIOR,
OTTAWA, CANADA.
DOMINION LINE
Royal Mail Steamships
Between LIVERPOOL, BRISTOL and MONTREAL
HALIFAX and PORTLAND, MAINE, in Winter.
FLINN, MAIN & MONTGOMERY.


$00 DINE
40,000 MEN NEEDED 40,000
in
WESTERN CANADA
To Harvest 100,000,000 BUSHELS OF GRAIN
ST PAUL-MINNEAPOLIS


AN ILLUSTRATED
A UNIQUE OPPORTUNITY
FOR THE RESIDENTS
OF THE DISTRICT.
LECTURE ON CANADA
"THE LAND OF OPPORTUNITY"
WILL BE GIVEN BY
MR. F. O. CHAPMAN,
CANADIAN GOVERNMENT LECTURER,
IN THE VICTORIA MEMORIAL INSTITUTE
LINGFIELD
On MONDAY, October, 14th, 1912,
AT 8 P.M.
ADMISSION FREE.
48, Lord Street, Liverpool;
139, Corporation Street, Birmingham;
81, Queen Street, Exeter;
16, Parliament Street, York.
GRAIN ELEVATOR
CAPACITY 3500000 BUSHELS
CANADIAN GOVERNMENT EMIGRATION AGENTS

AGRICULTURAL LAND-USE CHANGE IN CANADA: A PERSPECTIVE

Canada has long been seen, at home and abroad, as a breadbasket of immense potential. In 1930, the federal government estimated that Canada had potentially 142 million hectares of agricultural land, over 81 million of which was as yet unused. Based on this information, economist Stephen Leacock calculated that Canada could support 250 million people (Leacock, 1930, 50; MacKintosh, 1937, 71). It is now obvious that this prospect has not been fulfilled. In 1981, Canadian agriculture, aided by seasonal imports, supported a population of 24 million and an export market in grain, using about 70 million hectares of the land. It is apparent that less unused potential remains than was thought in 1930 (Simpson-Lewis, *et al.*, 1979) and most of the remaining land has poorer soil and climatic conditions than that currently in use (Agriculture Canada, 1980). The lands that constitute Canada's reserve of agricultural land are "found on the northern fringe of settlement, on wet lands and slopes, and they will be expensive and difficult to farm even if food prices rise substantially" (Ontario. Energy and Agriculture Committee, 1981, 9).

The purpose of this paper is to examine what has happened to Canada's agricultural land base. Specifically, this paper analyses changes in agricultural land use from 1961 to 1976, the period during which the most significant changes have taken place. The study begins by setting the idea of the Canadian cornucopia alongside the emerging reality. Through the Canada Land Inventory (CLI) and a modification of census data, a new perspective is presented that highlights the changes that have been taking place in over 200 regions of Canada. Having established the national context, the study then turns to the processes at work in rural Canada. The paper will investigate changes in the use of Canada's farmland and will assess the causes and problems associated with the processes involved. The goal is to provide an understanding of what has been happening to Canada's agricultural land resource, show why it has been happening, and identify some of the consequences of these changes.

Organization of the Paper

By reviewing changes in the use of rural land in the various regions of Canada and in one specific study area from Ontario, this paper examines what has happened to Canada's agricultural land resource and why it has occurred. The reader is led from the national picture to the regional microcosm and then to the individual whose decisions, influenced by external factors, are the final arbiter of land use. Chapter One documents some of the concerns about what has been happening to the national agricultural land resource. In Chapter Two, the use of a new data set permits the identification of areas where significant gains and losses in agricultural land and land in improved farming practice have occurred. The specific nature and extent of these losses is examined and related to national statistics on losses in numbers of farms, changes in average farm size, and the quality of the land resource.

In Chapter Three a model is developed to indicate how the process of agricultural land-use change is generally hypothesized to have taken place. Based on this theoretical model, specific regions of Canada showing different characteristics of land-use change are identified: the heartland, the advancing frontier, retreating margins, and the urban fringe. The relative significance of each of these regions is discussed, with emphasis on the heartland as the prime producer of Canadian agricultural products. Chapter Four concentrates on one particular area of the nation's agricultural heartland—the Saugeen Valley of Ontario. This region is used as a laboratory, parallelling the national and eastern heartland trends, in order to examine in detail what land went to what uses over the ten-year period from 1966 to 1976. In Chapter Five, the causes of observed changes are examined in terms of their significance within the case study area, and Chapter Six continues to assess how individual landowners act in response to the various documented causal factors. The cumulative effect of decisions is shown to produce major changes in the way in which rural land-use changes occur in the Saugeen Valley and, by analogy, within other parts of rural Canada.

◀ Four posters promoting development in Canada.
Public Archives of Canada

Table 1.1

CLI Classification for Soil Capability for Agriculture

by Province and by CLI Class

(in hectares)

Province	Class 1	2	3	4	5	6	7	'O' (Organic)	Unclassed
Newfoundland[1]	0	0	1,851	16,613	91,517	207,439	644,075	217,918	1,446,929
Prince Edward Island	0	261,561	141,519	49,776	76,064	0	27,716	6,686	181
Nova Scotia	0	166,317	982,877	424,410	82,215	14,325	3,516,041	116,301	860
New Brunswick	0	160,528	1,151,144	2,032,089	1,700,253	11,543	1,838,630	132,768	115,306
Quebec	19,556	907,106	1,277,202	2,580,503	1,658,600	10,671	20,599,589	1,516,902	132,117
Ontario	2,156,752	2,217,667	2,908,818	2,624,648	1,915,301	1,140,285	11,221,332	2,563,271	782,742
Manitoba	162,501	2,530,607	2,440,659	2,394,118	2,323,786	2,092,169	1,088,592	4,741,738	3,858,208
Saskatchewan	999,691	5,874,448	9,424,700	3,893,109	8,736,287	3,950,141	225,526	2,788,605	1,126,956
Alberta	786,527	3,837,093	6,105,329	9,279,576	11,093,057	3,930,670	4,191,398	5,991,972	2,658,857
British Columbia[2]	21,057	235,474	692,026	1,701,678	6,671,675	5,419,073	15,254,812	N/A	65,798,339
N.W.T. and Yukon[3]	--	--	--	--	--	--	--	--	--
TOTAL	4,146,084	16,190,801	25,126,125	24,996,520	34,348,755	16,776,316	58,607,711	18,076,161	75,920,495

Unclassed = Unmapped areas; water areas; forest reserves; national parks; urban areas and provincial parks.

N/A = Not available.

[1] Includes areas of Newfoundland within a 100 mile (161 km) radius of St. John.
[2] Includes British Columbia data using unimproved rating and 'O' (Organic) soils which are included with the mineral soils of the same rating.
[3] Not covered by CLI.

SOURCE: Environment Canada. Lands Directorate, Land Data and Evaluation Branch, 1980.
British Columbia Environment and Land Use Committee Secretariat, 1976.
Neimanis, V.P. 1979.

Tobacco farming in Kingsport, Nova Scotia.
E.W. Manning

The paper concludes by working back from the individual to the national pattern: the final chapter reviews the overall process of land-use change and its implications for the farmer, the region, and the nation.

The National Picture

The Canada Land Inventory agricultural capability survey (Environment Canada, 1976) found only 122 million hectares with any agricultural capability whatsoever* (see Table 1.1). This comprehensive, nationwide inventory called into question the concept of an unlimited Canadian land resource. By including organic soils and some small regions outside CLI boundaries, the total area of land with agricultural potential is raised to a maximum of 136 million hectares, much of which is only marginally agricultural. Only 45.9 million hectares can be considered to have any capability for crop production. Thus, the addition of capability information has significantly tempered the gross area estimates of earlier times.

According to the census, the amount of land in Canadian farming reached its historical peak in 1951, occupying more than 70 million hectares, with about 600,000 farm operators. Since the 1950s, with the exception of the 1966 census, the area under agricultural production and the number of farmers have been declining.

Despite the declining land base, the amount of agricultural production has been generally rising, through improved varieties, greater use of chemicals, improved farming techniques, and more intensive use of the land (see Table 1.2). From 1961 to 1976, Canada had a net loss of more than 1.4 million hectares of farmland. This figure is derived directly from the census of agriculture

* For the purpose of this paper, the term "agricultural land" will refer to CLI agricultural classes 1-6, "cropland" refers to classes 1-3, "best or prime" land refers to class 1 only. "Census farms" are defined as properties larger than 1 acre (.4 hectares) with a value of sales of agricultural products in excess of $50. "Improved land" is defined as cropland, improved pasture, summer fallow, and other improved land as defined in agricultural census publications. "Unimproved land" consists of woodland, uncultivated native pasture or hay, brush, grazing or wasteland, sloughs, marsh or rocky land within the boundaries of census farms.

which documents the area of both improved and unimproved land within the boundaries of census farms. While the farmland loss of 1.4 million hectares is significant, the total amount of decline only tells part of the story. The overall farmland loss should be contrasted directly with the gradual increases in the amount of land in improved agricultural practice and with the growing volume of production from the remaining farmland.

In Canada between 1961 and 1976, there was a net loss of more than 3.9 million hectares of farmland east of the Manitoba border and, at the same time, a net expansion of 2.5 million hectares of farmland in the west. During the same period across the country, the number of farms declined from 480,000 to nearly 300,000 (a decline of 29.5%), a continuing loss from the maximum number of 732,000 farms reported in 1941 (see Table 1.2 and Appendix A). Simultaneously, the average farm size in Canada rose from 145 hectares in 1961 to 202 hectares in 1976, with increases reported in most provinces (see Appendix A).

The National Importance of Farmland Trends

The future of Canada's best agricultural land has become a matter of considerable concern for farmers, politicians, academics, and the general public (Bentley, 1981). It is now evident that, despite the vast size of Canada, only 11% of the land is of any agricultural use, and only one-half of 1% is prime agricultural land. Compare this with the fact that the major urban centres are located directly on the best land and the cause for concern becomes apparent (refer to Manning and McCuaig, 1977; Neimanis, 1979).

Table 1.2

Absolute Changes in Regional Agricultural Statistics, 1961-1976

(in hectares)

	West	East	Net National Total
		(ha)	
Total Farmland	+2,508,611	-3,908,986	-1,400,375
Improved Farmland	+3,725,331	-1,344,639	+2,380,693
Number of Farms	-46,752	-95,573	-142,325
Average Farm Size	+74	+13	+56

Note: Canada is divided East/West at the Manitoba/Ontario border.

SOURCE: Statistics Canada.

Despite concerns about the maintenance and use of farmland, Canada is, and has the potential to remain, relatively self-sufficient in many foodstuffs (Task Force on the Orientation of Canadian Agriculture, 1977). While Canada relies on overseas production of horticultural products, oilseeds, and beef to compensate for shortages, the country also has a good export market in many food products, principally in grains. Agricultural exports amounted to 7% of total export earnings in 1978, though this figure is down from 21% in 1961 (Canada. The Tariff Board, 1977). The continued existence and productive capacity of the agricultural land resource will definitely bear a close relationship both to future import levels of meats, oilseeds, and horticultural products and to export earnings, and so is a matter of legitimate national concern. The importance of agriculture to the nation can also be measured in terms of its direct contribution to the economy as an employer and producer of food and as a significant part of the processing and service sectors. These functions rest on the role of the agricultural sector as the custodian of a substantial percentage of the nation's land resource.

However, agriculture has been declining relative to other sectors of the economy. From 1961 to 1976, the proportion of GNP contributed by agriculture dropped from 2.7% to 1.6%.* The employment of Canadians in agriculture has also dropped substantially from 11.2% in 1961 to 5.0% in 1976, another indication of the long-term decline of agriculture.

The significance of these trends is that Canada is gradually eliminating its options for future food production strategies. Imports of agricultural produce from

* 1976 includes value of physical change in farm inventories and accrued earnings of farm operators arising out of operations of the Canada Wheat Board.

Mixed farming near Perth, Ontario.
E.W. Manning

Hobby farms alongside commercial farming in the Coldstream Valley of B.C.
E.W. Manning

1961 to 1976 grew from 854 million dollars to 2,872 million dollars, an increase of 69.5% in constant 1971 dollars. In particular, imports of such key foodstuffs as fresh produce and fruits (even in season) reveal an increasing dependence on foreign sources. Whether this growing dependence on foreign sources is a cause or consequence of the loss of agricultural land remains to be seen. Many farming organizations contend that a failure to protect Canadian foodstuffs from seasonal imports is a major factor in the loss of markets for Canadian produce (Canada. The Tariff Board, 1978). The opposite argument has also been made; wholesalers often claim that the failure to produce consistent quality and quantity has driven them to foreign sources. In either case, the maintenance of the agricultural land base allows Canada to maintain its options and reduces the reliance on foreign sources for foodstuffs. If areas of better agricultural land are paved over or fragmented, the production of key crops will either disappear from Canada or will be displaced onto poorer soils that require greater inputs of capital, labour, and energy to obtain the same product. However, Canadians are continuing to develop on the best of their agricultural land resource, taking short-term gains at the expense of future generations (Bentley, 1981a). This can only reduce Canadian future competitiveness relative to foreign sources and further exacerbate the problem of less secure food supplies.

Chapter Two

AGRICULTURAL LAND: WHAT HAPPENED?

Canadian agricultural land use has changed significantly since 1961. National and provincial data, while showing major net changes, do not reveal the dynamics and variations in the nature and extent of changes at a regional or local level. For a better understanding of what has occurred, of its relative regional and national importance, and for an examination of the processes involved, it is essential to work with more detailed information. This chapter, using specially-generated regional data for the 1961-1976 period, will focus on the extent of changes in agricultural land use, the areas where expansion and retreat of the farmland base have occurred, the trends in farming intensity and consolidation, and the changing value of rural properties.

The Data Set: A New Analytical Capability

Because agricultural land occupies over 70% of the Canadian ecumene*, it has usually been assumed that there would be a reasonable means of analyzing what is happening to that land. Certainly, considerable data are gathered by researchers and by Statistics Canada. During the 1960s and early 1970s, the Canada Land Inventory (CLI) categorized the capability of agricultural land in Canada for all those areas likely to have any potential. Thus there is at least one reasonable measure of land capability or of what land can possibly be put to agricultural use. However, the Canada Land Inventory documented the use of land in Canada during the mid-1960s, and apart from those regions around urban centres (Gierman, 1977; Warren and Rump, 1981), this work has yet to be expanded.

On the other hand, the agricultural census provides a comprehensive set of numbers every five years relating to all those land holdings in Canada defined as under agricultural use. Why then can trends not be simply extracted to determine what is taking place on the farms and in the rural regions of Canada? The answer lies in the variability of the census itself. The definition of a census farm has not always remained constant.

* The ecumene is understood as the closely occupied land area with continuous settlement integrated by a communications network (Warkentin, 1968, 176).

Similarly, the boundaries of the units used to collect census data have been in constant flux. For no two of the last five censuses have there been identical boundaries. Because of these constraints, it has not previously been possible for researchers to standardize spatial units to permit national time-series analysis of data from the agricultural, or indeed the population, Census of Canada.

How then can a clear analysis of land-use trends in rural Canada be obtained? At first glance, this would appear to be an onerous task. For one thing, it is impossible to adjust all other censuses to fit the boundaries of any given census at the level of the enumeration area (EA), the census tract (CT), the census subdivision (CSD), or the census division (CD). For different parts of the nation, these have all been changed at various points over the past twenty years. However, one important coincidence is that where there have been alterations in the boundaries of CSDs, there have not generally been alterations in the boundaries of the divisions of which they are a part. While both CD and CSD boundaries have changed over the years, almost all CD changes have been done by moving or joining entire CSDs or previously separately reported parts of CSDs. This fact permits the creation of standard units in the 1961, 1966, 1971, and 1976 censuses, which for the purposes of this paper are referred to as standard census districts or SCDs.*

This reassembly of census data is one means of organizing time-series analyses for Canadian regions. The 1976 census districts served as the base for standardization, but for some parts of the nation this was not possible, particularly for British Columbia, Newfoundland, and parts of Quebec. A total of 229 districts where the boundaries can be fixed for the period from 1961 to 1976 have been created. In a few cases (e.g., Matane/Matapedia and Brome/Shefford, Quebec, and parts of Newfoundland), census divisions had to be combined in order to avoid areas where the boundaries have been altered with no relationship to previously reported CSDs. In the case of British Columbia,

* For a map of the 229 standard census divisions, their identification, number, and name, refer to Appendix B.

◀ Ball's Falls, Ontario.
E.W. Manning

Long-lot farming in Isle d'Orleans, Quebec.
Mia and Klaus, NFB Phototheque

units from various different levels of census divisions, sub-divisions, and municipalities were assembled to obtain constant SCD boundaries. The object of this approach is to avoid random or proportional allocation procedures that would limit the use of the finished product. Furthermore, because the data are accumulated from the CSD level, most of the problems relating to confidentiality of data at smaller unit levels (e.g., EAs and CTs) were avoided. Data sets were based on basic census statistics and not on the census computer tapes which contain far too great a level of error, even on the sub-district or district level, because of confidentiality limits placed on the data at the EA level.

The problem of changing criteria for census farms was also addressed. Because the 1976 definition of a census farm was changed to any unit with a production value of $1,200 from one acre or more, it was necessary to standardize the data to the 1961-71 definition of $50 or more of farm sales from an area of more than one acre (census data collected in acres before 1981). To adjust the 1976 definition, special data runs for small farms, with production value of $50 an acre, were developed by Statistics Canada.

Once the SCDs and standard definition had been developed, a Statistical Package for the Social Sciences (SPSS) program (Nie, *et al.*, 1975) was used to analyse a variety of variables for the 229 individual SCDs. Among the data entered were variables relating to the amount of land in agriculture, the amount of improved land, the value of land and buildings, and the number of farms for the years 1961, 1966, 1971, and 1976. In addition to these variables, information was entered for the same spatial units on the Agroclimatic Resource Index (Williams, 1975) and on the amount of land with each CLI agricultural capability class; the latter was produced through an overlay process by the Canada Land Data System. From these raw variables, 150 variables were derived, detailing such information as average farm size, levels of capitalization per unit area and per farm, ratios of land in use to quality or to improved land, and the rates of change for all of these.

The Agricultural Census and Rural Land-Use Change

The Census of Agriculture is a valuable data source for rural research, being a comprehensive inventory of all farms and farmers collected nationwide every five years. Enumerators are responsible for all properties within their enumeration areas, whether farm or non-farm, resident or non-resident. All are canvassed, with non-farms identified at the questionnaire stage and eliminated from the tally. Properties not accounted for within the enumeration area are handled by seeking the registered owners at their place of residence. Nevertheless, what constitutes a "census farm" may differ from the common perception of a farm. While some unfarmed land is captured within the boundaries of census farm units, the census does pick up all land that is farmed—even if it is leased to or from others. The census documents how much land is used for farming and gives some information on the present cover (crops, pasture, woodland) of that land.

The agricultural census provides a snapshot of agriculture at the time of each census. The number of census farms, farm size, crops, machinery, and improvements are some of the variables collected. Changes can therefore be calculated for such units as townships or census districts, which usually maintain their boundaries from census to census. Thus, the net change in agricultural land area, land use, improvements, etc., can be obtained for specific unit areas. So long as definitions within any variable are constant, or special data runs can be obtained to generate data on constant definitions (e.g., the $50 farm-size run for 1976), the census is an accurate (less than 1% variance at the township level) and comprehensive data source.

One limitation of the agricultural census as a research tool has been the inconsistency of definitions for many variables. For time series analyses, use of the agricultural census is therefore confined to variables with constant definitions for the study period, or instances where special data runs based on consistent definitions can be derived through adjustment. The value of time series analyses tends to diminish with longer study periods, since variables must be dropped because of definitional changes. Researchers are also warned to stay away from the census computer tapes, since the data has been significantly altered at all levels to accommodate confidentiality requirements at the lowest level. The published documents or special data runs have not been altered and so do not contain inaccuracies.

While the census reveals net changes, it does not go into the internal dynamics of these changes. The census indicates that rural change is occurring, but it does not document where new agricultural land came from, or where "lost" agricultural land went. The census shows net changes over a five-year period with good accuracy for such major variables as numbers, area, capitalization levels, but it does not identify what internal shifts comprised the net result, whose land entered farming and whose land left. These data can only be obtained through further research, by a field-mapping methodology, and by a door-to-door or property-to-property interview approach.

The principal advantages of the agricultural census derive from its nationwide coverage and its periodocity, and, above all, it is cost-free to researchers unless special runs are required. Despite the limitations to its use at the farm level, due primarily to confidentiality of specific information, the agricultural census is a significant data source for regional and national level analyses. Through the agricultural census, national level hypotheses can be tested and specific regions where significant changes have occurred can be identified for more detailed research.

By integrating the Agroclimatic Resource Index (ACRI) with some of the information on changing farmland area, it has been possible to produce weighted numbers relating to the rates of farmland gain and loss in different districts of Canada. Similarly, simple indices relating the amount of land under improved agricultural use to land capabilities were developed for each of the 229 SCDs.

The data derived for the SCDs will be used to show the spatial pattern of where changes in the number of farms, the area of total farmland, the area of improved land, and in farmland value have occurred and of how these all have related to one another and to overall agricultural land quality in Canada. For a more detailed discussion of procedures used to create and run this data system refer to Appendix C.

The Tally Sheet: Farmland Losses and Gains

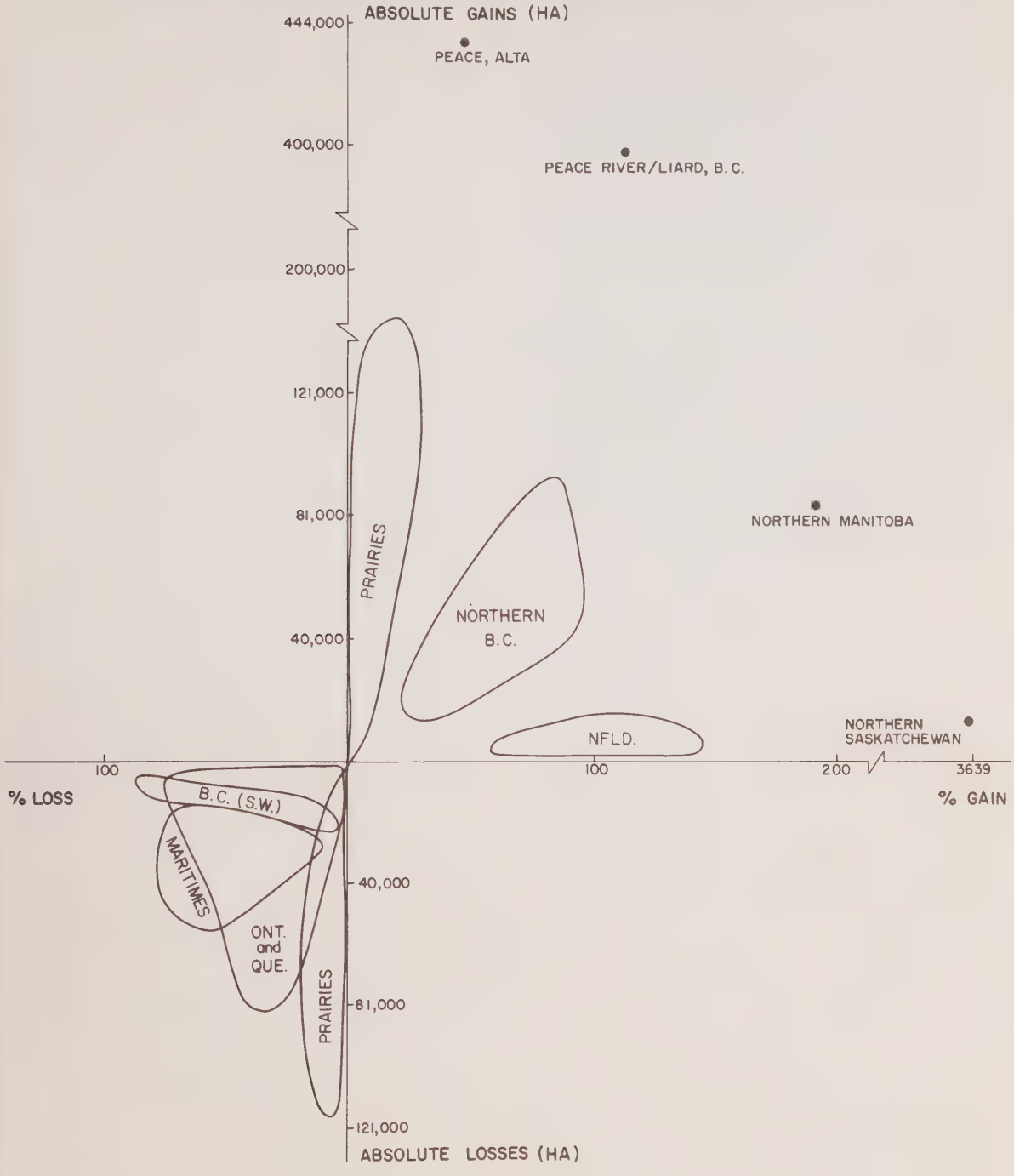
The purpose of the farmland tally sheet is to identify the magnitude of shifts into and out of farms, regardless of the quality of the land involved or the intensity of its use (the importance of land quality and intensity of use will be examined later). When assessing gains and losses in farmland, it is necessary to turn to two separate measures: the total area within census farms and the area of land in improved agricultural practice. The total area within the boundaries of census farms will be referred to in the remainder of this paper as "farmland", and the land under improved agricultural practices, according to the definition of the census, will be described as "improved" land. As will be seen later in this chapter, while there is generally a regional correspondence in what is occurring in both categories, there are a number of interesting anomalies indicative of some of the regional processes taking place.

While there has been an overall decline in the amount of farmland in Canada since the 1951 census, there has been a steady increase in the area of farmland under improved agricultural practice. Thus, at the national level, we have the anomaly of less land within farms, but of more of that land being more intensively

Harvesting forage in Raymond, Alberta.
Agriculture Canada

FIGURE 2.1

REGIONAL GROUPINGS OF CHANGES IN FARMLAND AREA 1961-1976

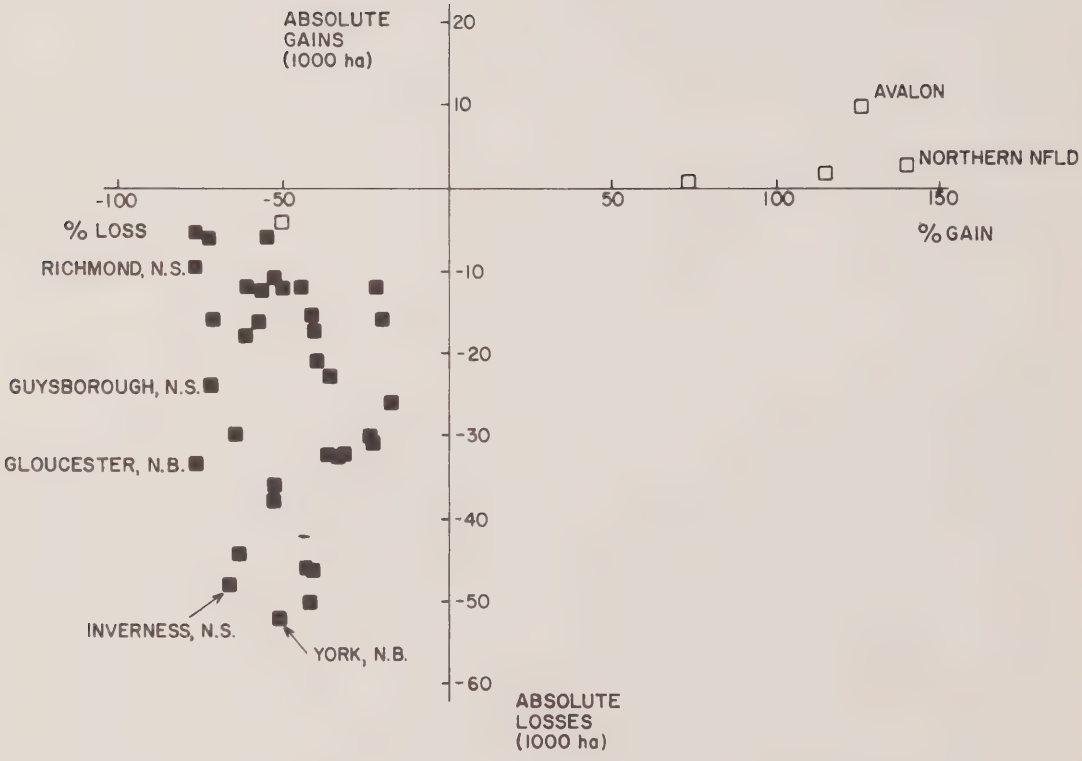


SOURCE: NATIONAL DATA BASE

FIGURE 2.2

PERCENT AND ABSOLUTE CHANGE IN TOTAL AGRICULTURAL AREA BY REGION

Atlantic Region



SOURCE: NATIONAL DATA BASE

used. Since the national farmland total conceals substantial regional and local changes, the gains and losses must be examined from both a regional and a national perspective.

Gains and losses of farmland should also be understood in the context of the quality of the land involved. The loss of one hectare of Class 1 land in southern Ontario or the B.C. lower mainland obviously cannot be equated to the gain of one hectare of poorer quality land in the Peace or Kenora areas. Fortunately, the ACRI can assist by measuring the relative production values of lands in different parts of Canada (Williams, 1975). Later in this chapter, this index will be introduced in reference to the productive ability of the farmland lost and gained.

Figures 2.1 to 2.4 demonstrate the patterns of regional changes in farmland area over the 15-year period from 1961 to 1976. These diagrams reveal substantial regional differences in the magnitude of farmland losses or gains in both absolute and percentage terms. The SCDs furthest away from the horizontal axis of the diagrams are those with the greatest changes (notwithstanding questions of land quality). From a regional point of view, percentage loss or gain is likely to be more important because of the local impact of major changes; distance of an SCD from the vertical axis is therefore an indication of relative regional importance.

Figure 2.1 is a generalized representation of the regional relationship of both absolute and relative changes in farmland area. The largest absolute changes nationally have occurred in the west, with the east showing smaller changes, generally losses. However, the changes in the east—notably in the Maritimes and Quebec—are shown to be regionally important. The diagram also demonstrates the regional and national significance of the massive gains in the Peace River area.

The Atlantic Region (Figure 2.2) can be divided into two distinct parts: Newfoundland and the Maritime Provinces. Newfoundland appears as an anomaly throughout this paper, because of its small agricultural land base and the minimal changes in farmland use required to produce large percentage changes. The data for Newfoundland show large percentage increases in most regions, representing a few thousand hectares in total. These increases are of considerable local importance for milk production and for fresh produce, though many of the changes can be attributed to the creation of community pastures in recent years.

The Maritimes, in contrast to Newfoundland, are losing a substantial percentage of their farmland from a regionally significant base. All SCDs in the Maritimes

A cattle operation in the Columbia Valley, B.C.
E.W. Manning

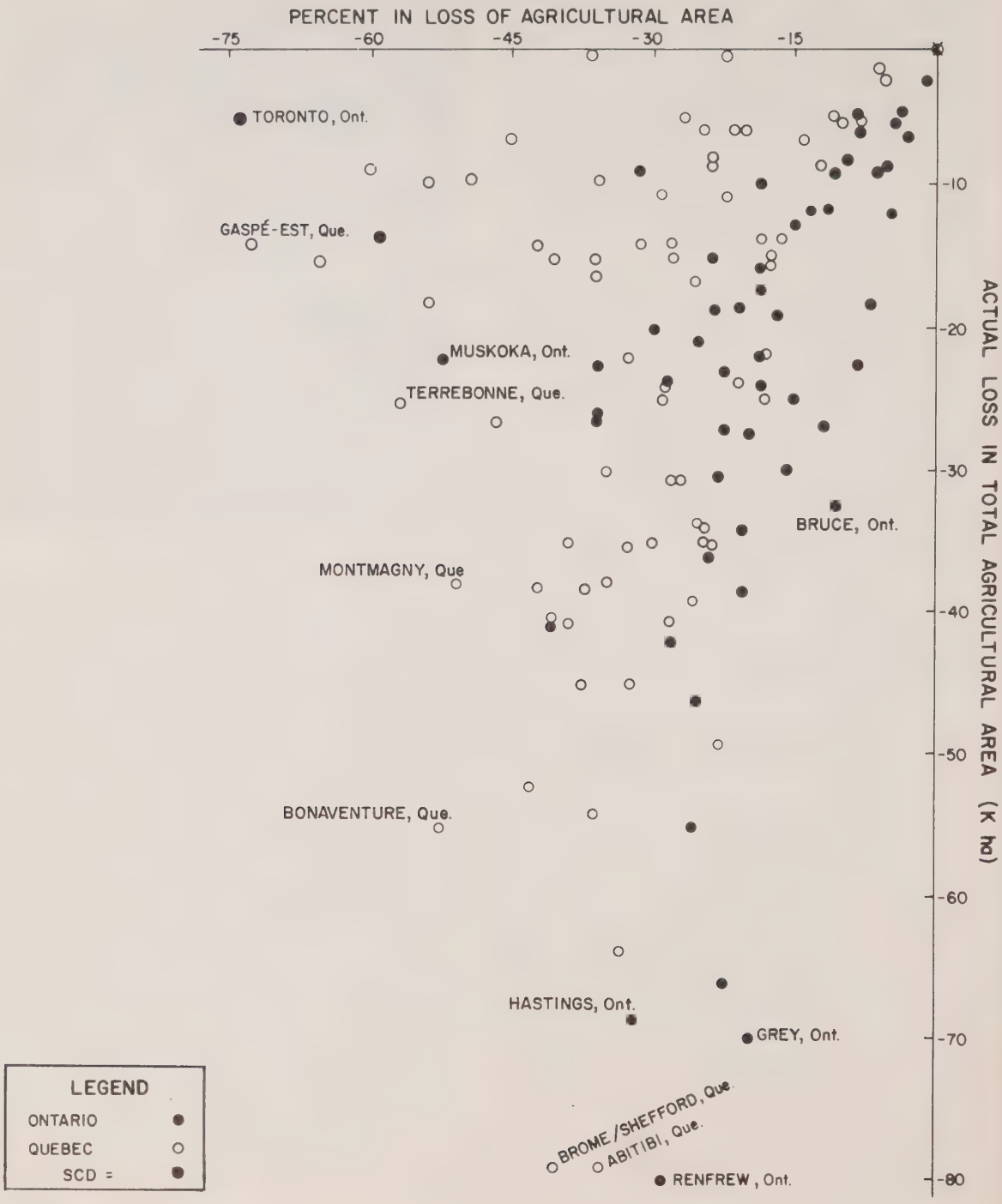
reported farmland losses, many of over 50% in 15 years (1961-76). In national terms, Maritime farmland losses are small; the total area of farmland in the Maritimes is less than the area of farmland in most individual SCDs in Saskatchewan or Alberta. Nevertheless, large percentage losses can have major social and economic consequences for the region, bringing the level of agricultural activity below the thresholds necessary for essential support services and activities.

All SCDs in central Canada (Figure 2.3) lost farmland from 1961 to 1976, though these losses vary in regional and national importance. Large absolute losses occurred in the Abitibi, Brome/Shefford, and Renfrew SCDs. The SCDs of the Gaspé region of Quebec had the greatest percentage losses of any area in Canada, most losing more than 60% of their farmland in 15 years. Many of the Quebec SCDs showed significant losses (over 20%), though several represented small absolute areas because of the size of the reporting units. Toronto has urbanized nearly the entire SCD, almost all of which is CLI classes 1, 2, or 3. Most SCDs in Ontario showed losses of nearly 20%, with the total farmland area lost of considerable national significance. Some census subdivisions around Toronto lost 75% to 100% of their farmland.

FIGURE 2.3

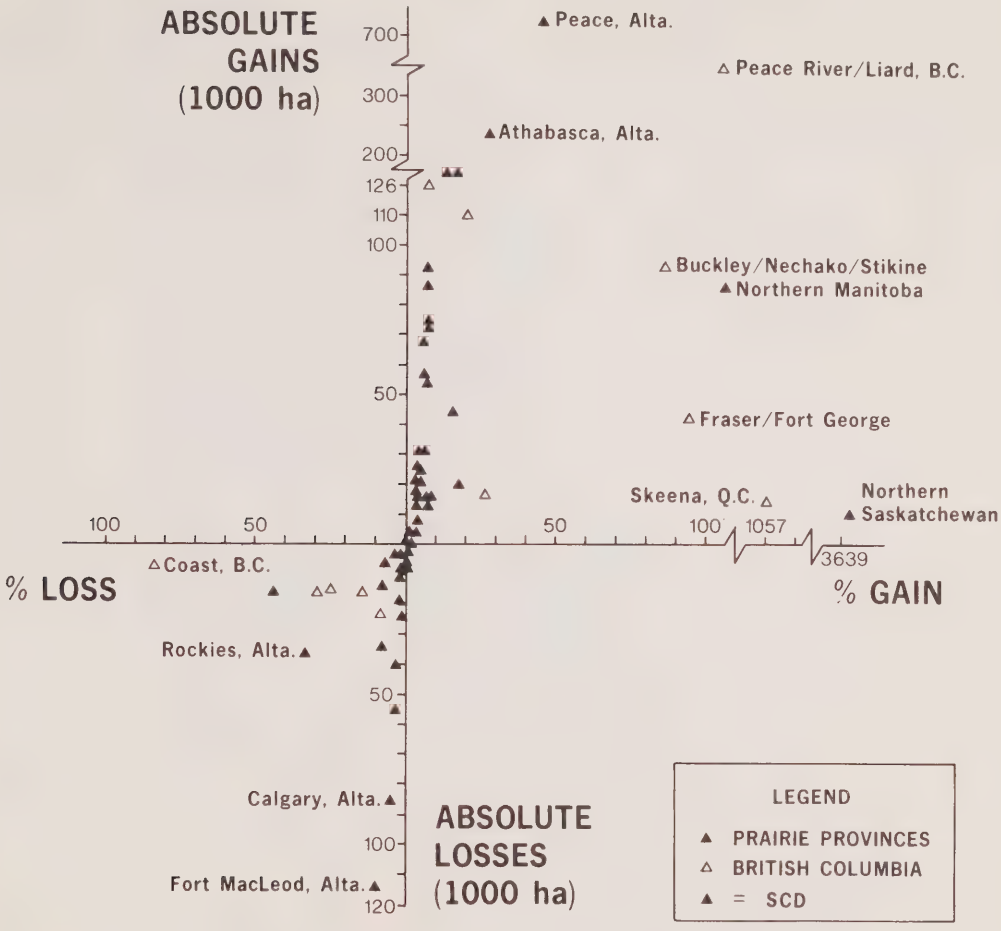
PERCENT AND ABSOLUTE CHANGE IN TOTAL AGRICULTURAL AREA BY REGION

Ontario and Quebec



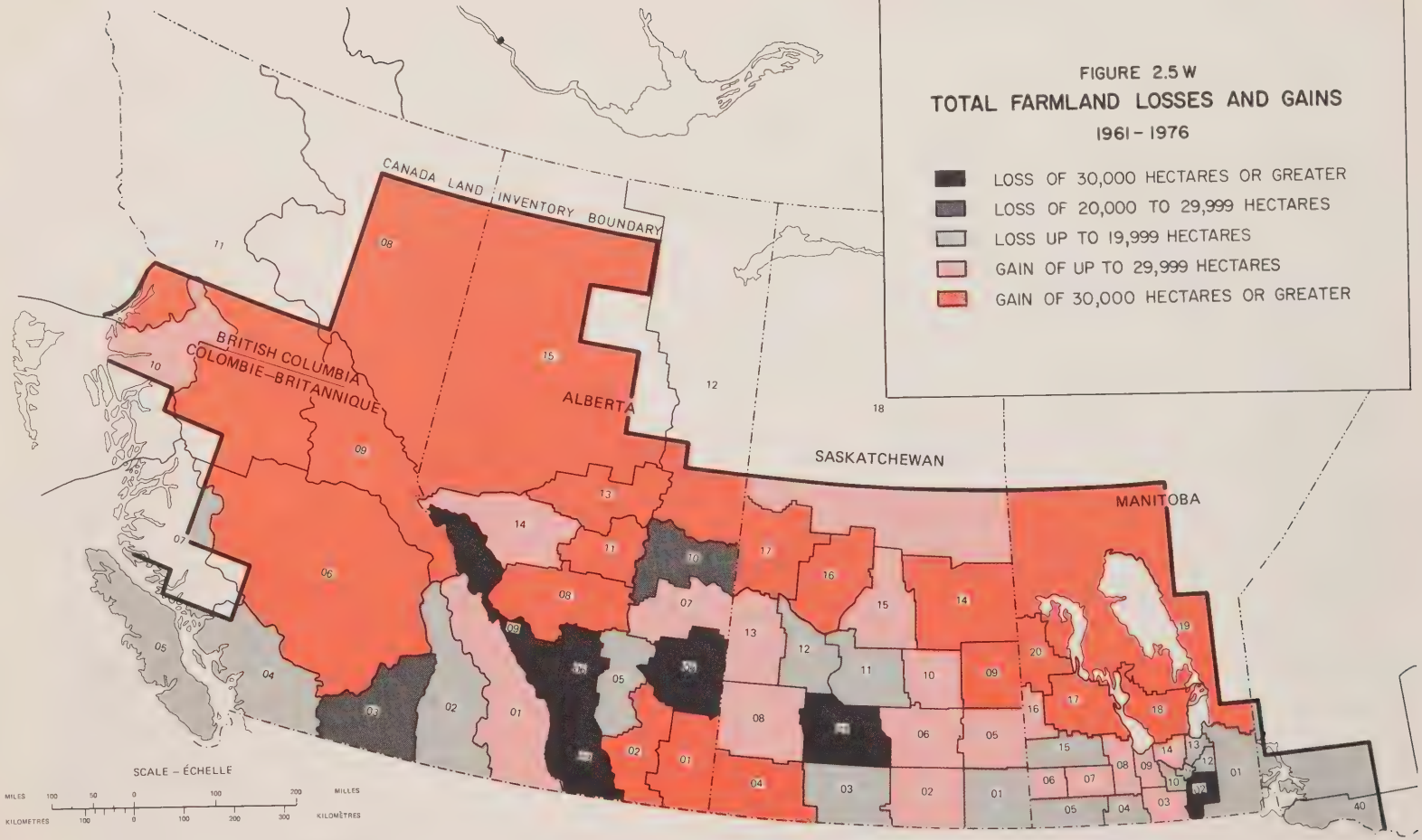
SOURCE: NATIONAL DATA BASE

Figure 2.4
PERCENT AND ABSOLUTE CHANGE IN TOTAL AGRICULTURAL AREA BY REGION 1961-1976 WESTERN PROVINCES



Source: National Data Base

Most parts of the west (Figure 2.4) gained farmland. The most significant national and regional gains in farmland area were in the Peace River regions of Alberta and British Columbia. The Peace River district of Alberta alone accounted for 745,497 hectares of farmland brought into production from 1961 to 1976, while the adjoining Peace River area in British Columbia added almost 400,125 hectares. Large gains were recorded in much of the northern prairies, and losses in farmland appeared throughout southwestern British Columbia and around Calgary and Fort McLeod.



BRITISH COLUMBIA / COLOMBIE-BRITANNIQUE

01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine

ALBERTA

01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace

SASKATCHEWAN

01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan

MANITOBA

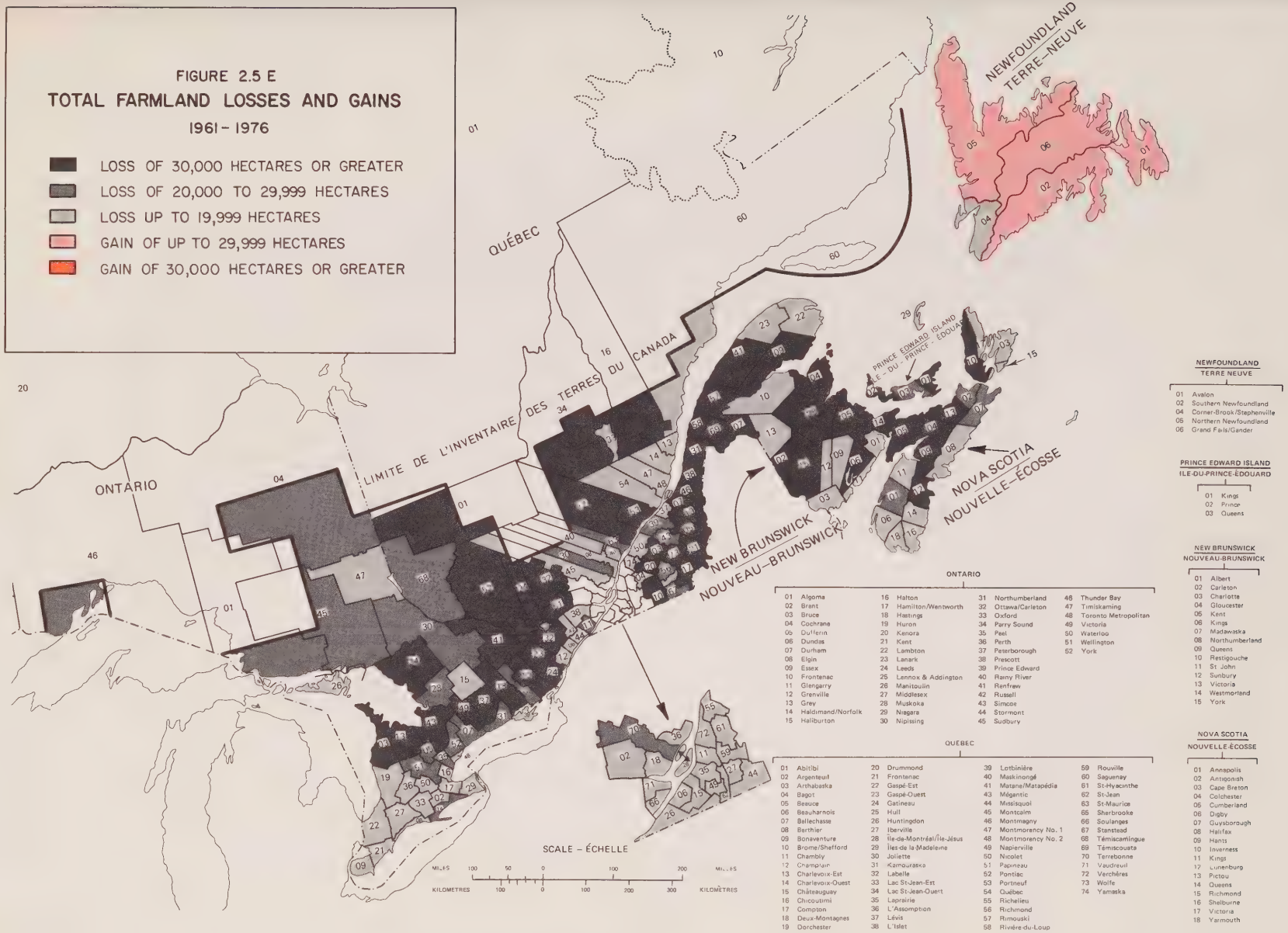
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.5 E

TOTAL FARMLAND LOSSES AND GAINS

1961 - 1976

- LOSS OF 30,000 HECTARES OR GREATER
- LOSS OF 20,000 TO 29,999 HECTARES
- LOSS UP TO 19,999 HECTARES
- GAIN OF UP TO 29,999 HECTARES
- GAIN OF 30,000 HECTARES OR GREATER



NEWFOUNDLAND / TERRE-NEUVE

01 Avalon
02 Southern Newfoundland
04 Corner-Brook/Stephenville
05 Northern Newfoundland
06 Grand Falls/Gander

PRINCE EDWARD ISLAND / ILE-DU-PRINCE-ÉDOUARD

01 Kings
02 Prince
03 Queens

NEW BRUNSWICK / NOUVEAU-BRUNSWICK

01 Albert
02 Carleton
03 Charlotte
04 Gloucester
05 Kent
06 Kings
07 Madawaska
08 Northumberland
09 Queens
10 Restigouche
11 St. John
12 Sunbury
13 Victoria
14 Westmorland
15 York

NOVA SCOTIA / NOUVELLE-ÉCOSSE

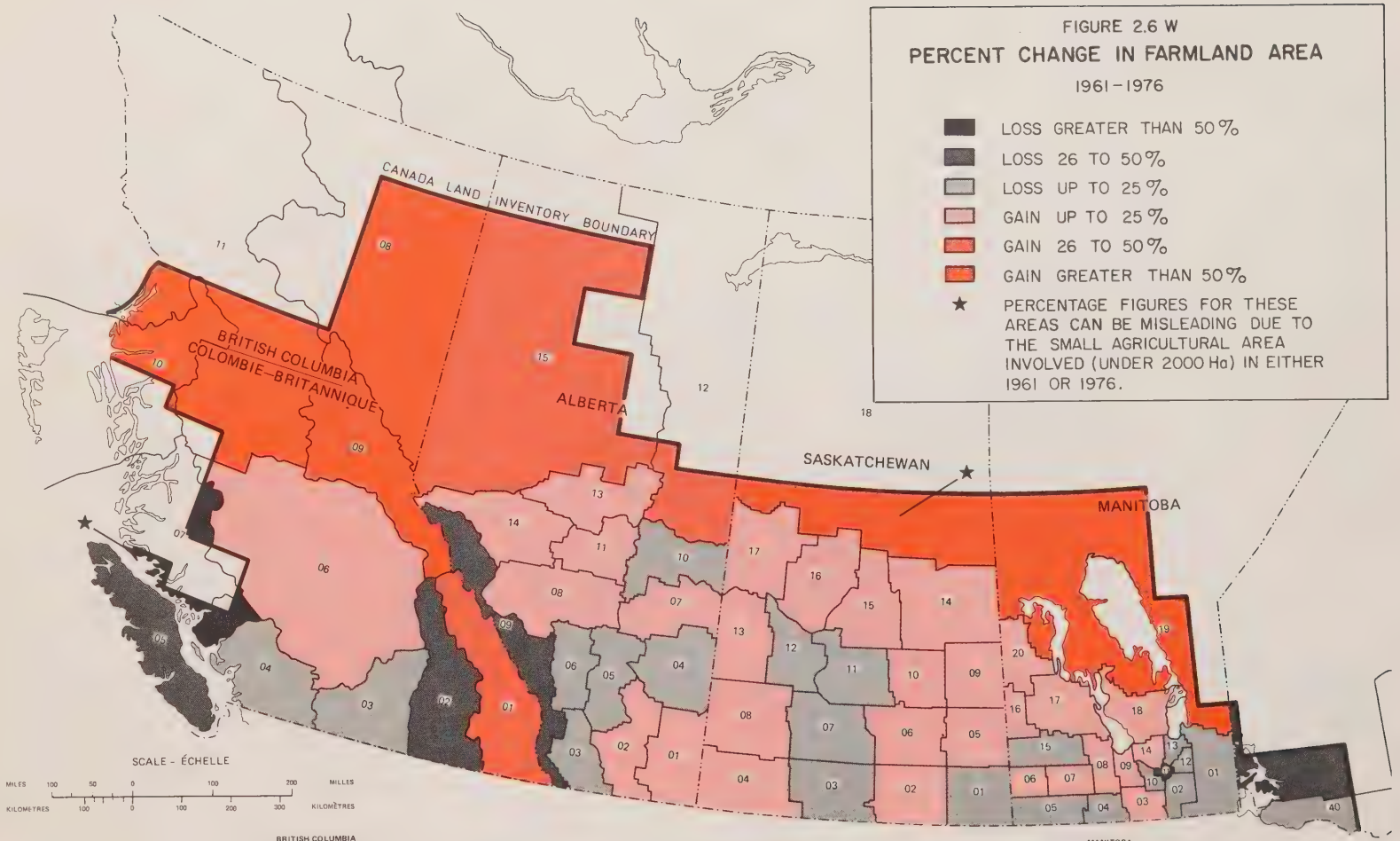
01 Annapolis
02 Antigonish
03 Cape Breton
04 Colchester
05 Cumberland
06 Digby
07 Guysborough
08 Halifax
09 Hants
10 Inverness
11 Kings
12 Lunenburg
13 Pictou
14 Queens
15 Richmond
16 Shelburne
17 Victoria
18 Yarmouth

ONTARIO

01 Algoma
02 Brant
03 Bruce
04 Cochrane
05 Dufferin
06 Dundas
07 Durham
08 Elgin
09 Essex
10 Frontenac
11 Glengarry
12 Grenville
13 Grey
14 Haldimand/Norfolk
15 Haliburton
16 Halton
17 Hamilton/Wentworth
18 Hastings
19 Huron
20 Kenora
21 Kent
22 Lambton
23 Lanark
24 Leeds
25 Lennox & Addington
26 Manitoulin
27 Middlesex
28 Muskoka
29 Niagara
30 Nipissing
31 Northumberland
32 Ottawa/Carleton
33 Oxford
34 Parry Sound
35 Peel
36 Perth
37 Peterborough
38 Prescott
39 Prince Edward
40 Rainy River
41 Renfrew
42 Russell
43 Simcoe
44 Stormont
45 Sudbury
46 Thunder Bay
47 Timiskaming
48 Toronto Metropolitan
49 Victoria
50 Waterloo
51 Wellington
52 York

QUÉBEC

01 Abitibi
02 Argenteuil
03 Arthabaska
04 Bagot
05 Beauce
06 Beauharnois
07 Bellechasse
08 Berthier
09 Bonaventure
10 Brome/Shefford
11 Chambly
12 Champlain
13 Charlevoix-Est
14 Charlevoix-Ouest
15 Châteauguay
16 Chicoutimi
17 Compton
18 Deux-Montagnes
19 Dorchester
20 Drummond
21 Frontenac
22 Gaspé-Est
23 Gaspé-Ouest
24 Gatineau
25 Hull
26 Huntingdon
27 Iberville
28 Île-de-Montréal/Île-Jésus
29 Îles-de-la-Madeleine
30 Joliette
31 Kamouraska
32 Labelle
33 Lac St-Jean-Est
34 Lac St-Jean-Ouest
35 Laprairie
36 L'Assomption
37 Lévis
38 L'Islet
39 Lotbinière
40 Maskinongé
41 Matane/Matapédia
43 Mégantic
44 Missisquoi
45 Montcalm
46 Montmagny
47 Montmorency No. 1
48 Montmorency No. 2
49 Napierville
50 Nicolet
51 Papineau
52 Pontiac
53 Portneuf
54 Québec
55 Richelieu
56 Richmond
57 Rimouski
58 Rivière-du-Loup
59 Rouville
60 Saguenay
61 St-Hyacinthe
62 St-Jean
63 St-Maurice
65 Sherbrooke
66 Soulanges
67 Stanstead
68 Témiscamingue
69 Témiscouata
70 Terrebonne
71 Vaudreuil
72 Verchères
73 Wolfe
74 Yamaska



BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE

01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine

ALBERTA

01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead

SASKATCHEWAN

01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan

MANITOBA

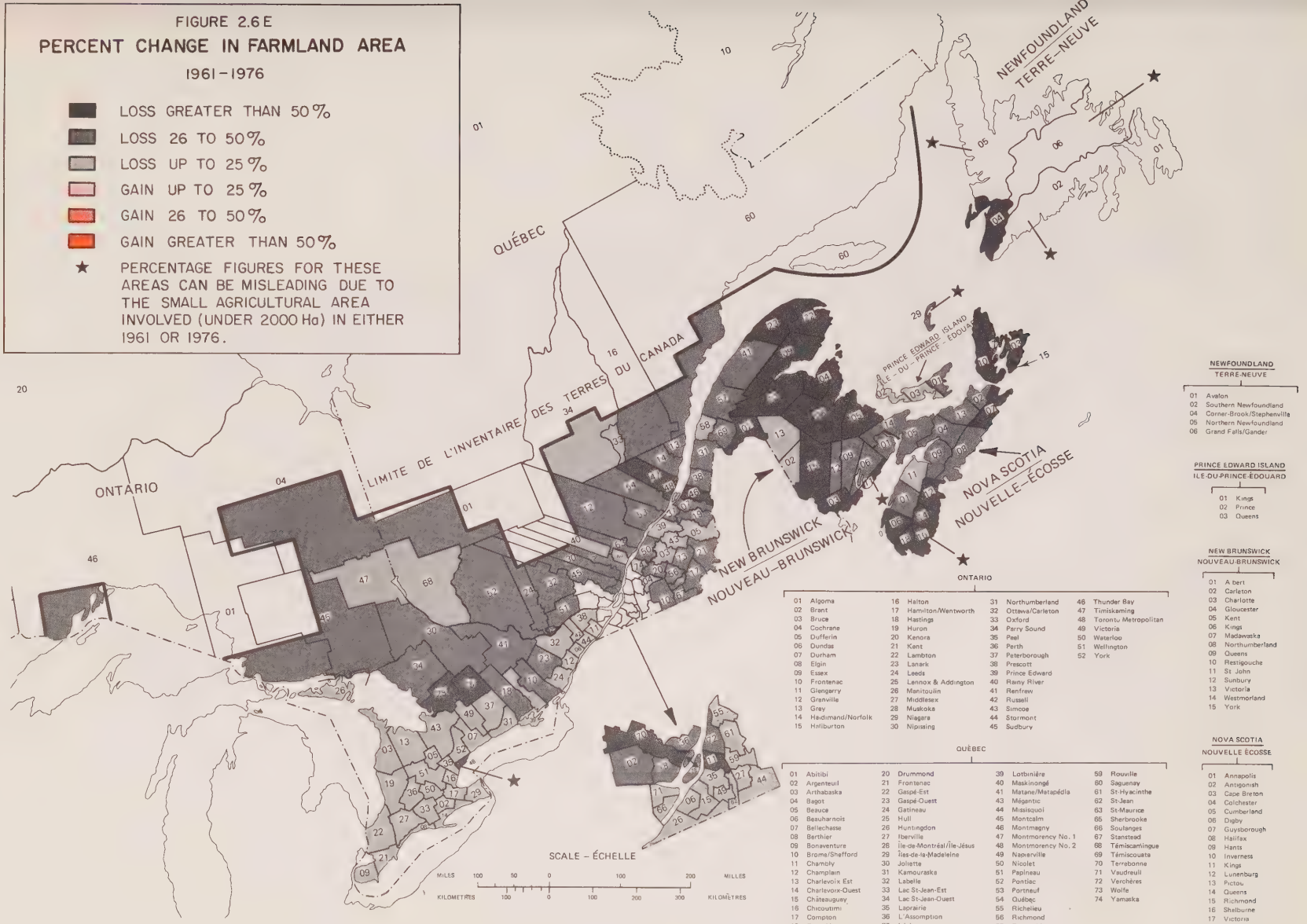
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.6 E

PERCENT CHANGE IN FARMLAND AREA

1961 - 1976

- LOSS GREATER THAN 50%
- LOSS 26 TO 50%
- LOSS UP TO 25%
- GAIN UP TO 25%
- GAIN 26 TO 50%
- GAIN GREATER THAN 50%
- ★ PERCENTAGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO THE SMALL AGRICULTURAL AREA INVOLVED (UNDER 2000 Ha) IN EITHER 1961 OR 1976.



NEWFOUNDLAND / TERRE-NEUVE

01 Avalon
02 Southern Newfoundland
04 Corner-Brook/Stephenville
05 Northern Newfoundland
06 Grand Falls/Gander

PRINCE EDWARD ISLAND / ILE-DU-PRINCE-ÉDOUARD

01 Kings
02 Prince
03 Queens

NEW BRUNSWICK / NOUVEAU-BRUNSWICK

01 Albert
02 Carleton
03 Charlotte
04 Gloucester
05 Kent
06 Kings
07 Madawaska
08 Northumberland
09 Queens
10 Restigouche
11 St. John
12 Sunbury
13 Victoria
14 Westmorland
15 York

NOVA SCOTIA / NOUVELLE-ÉCOSSE

01 Annapolis
02 Antigonish
03 Cape Breton
04 Colchester
05 Cumberland
06 Digby
07 Guysborough
08 Halifax
09 Hants
10 Inverness
11 Kings
12 Lunenburg
13 Pictou
14 Queens
15 Richmond
16 Shelburne
17 Victoria
18 Yarmouth

ONTARIO

01 Algoma
02 Brant
03 Bruce
04 Cochrane
05 Dufferin
06 Dundas
07 Durham
08 Elgin
09 Essex
10 Frontenac
11 Glengarry
12 Grenville
13 Grey
14 Haldimand/Norfolk
15 Haliburton
16 Halton
17 Hamilton/Wentworth
18 Hastings
19 Huron
20 Kenora
21 Kent
22 Lambton
23 Lanark
24 Leeds
25 Lennox & Addington
26 Manitoulin
27 Middlesex
28 Muskoka
29 Niagara
30 Nipissing
31 Northumberland
32 Ottawa/Carleton
33 Oxford
34 Parry Sound
35 Peel
36 Perth
37 Peterborough
38 Prescott
39 Prince Edward
40 Rainy River
41 Renfrew
42 Russell
43 Simcoe
44 Stormont
45 Sudbury
46 Thunder Bay
47 Timiskaming
48 Toronto Metropolitan
49 Victoria
50 Waterloo
51 Wellington
52 York

QUÉBEC

01 Abitibi
02 Argenteuil
03 Arthabaska
04 Bagot
05 Beauce
06 Beauharnois
07 Bellechasse
08 Berthier
09 Bonaventure
10 Brome/Shefford
11 Chambly
12 Champlain
13 Charlevoix Est
14 Charlevoix-Ouest
15 Châteauguay
16 Chicoutimi
17 Compton
18 Deux-Montagnes
19 Dorchester
20 Drummond
21 Frontenac
22 Gaspé-Est
23 Gaspé-Ouest
24 Gatineau
25 Hull
26 Huntingdon
27 Iberville
28 Île-de-Montréal/Île-Jésus
29 Îles-de-la-Madeleine
30 Joliette
31 Kamouraska
32 Labelle
33 Lac St-Jean-Est
34 Lac St-Jean-Ouest
35 Laprairie
36 L'Assomption
37 Lévis
38 L'Islet
39 Lotbinière
40 Maskinongé
41 Matane/Matapédia
42 Mégantic
43 Missisquoi
44 Montcalm
45 Montmagny
46 Montmorency No. 1
47 Montmorency No. 2
48 Napierville
49 Nicolet
50 Nicolet
51 Papineau
52 Pontiac
53 Portneuf
54 Québec
55 Richelieu
56 Richmond
57 Rimouski
58 Rivière-du-Loup
59 Rouville
60 Saguenay
61 St-Hyacinthe
62 St-Jean
63 St-Maurice
65 Sherbrooke
66 Soulanges
67 Stanstead
68 Témiscamingue
69 Témiscouata
70 Terrebonne
71 Vaudreuil
72 Verchères
73 Wolfe
74 Yamaska

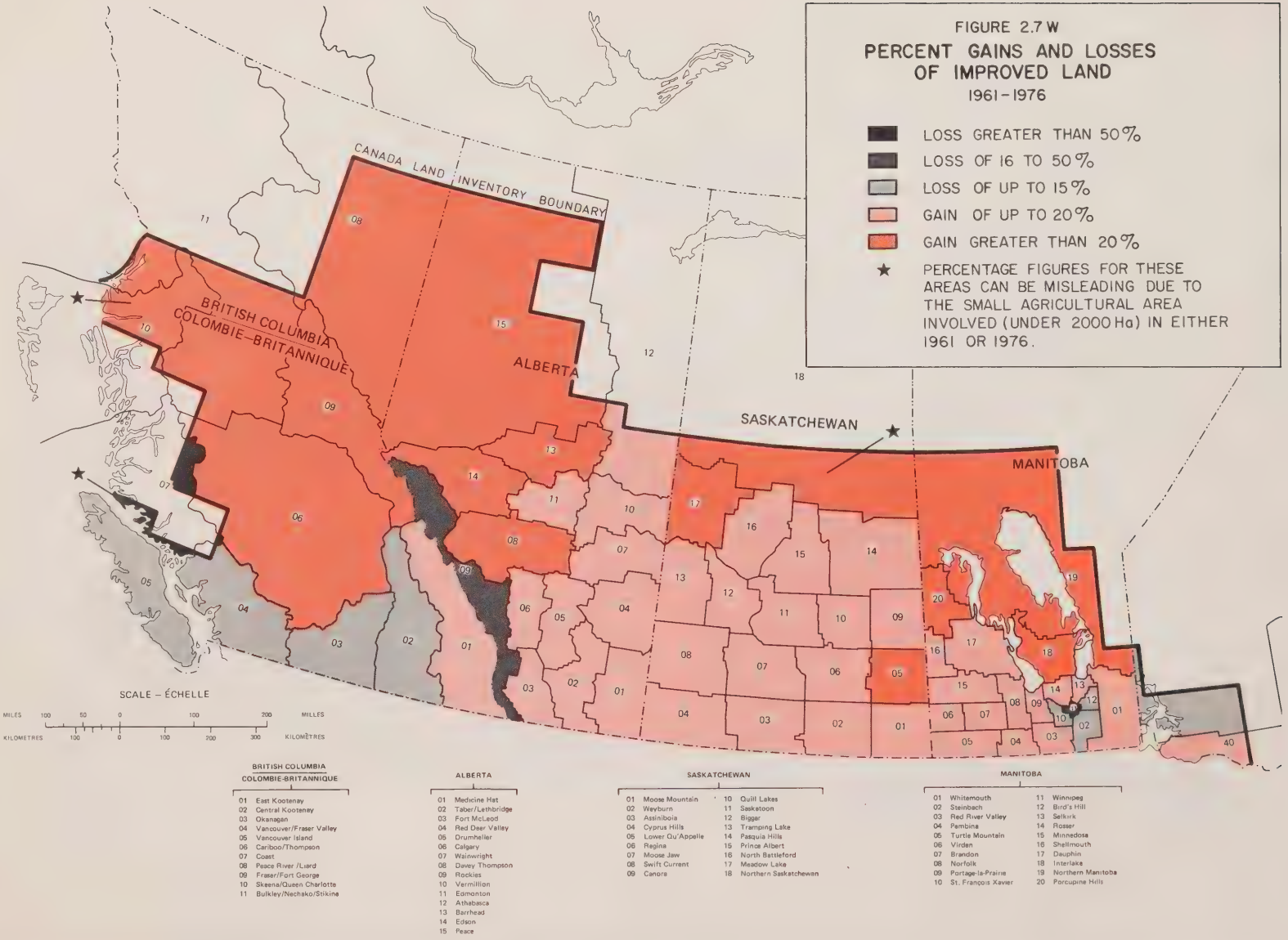


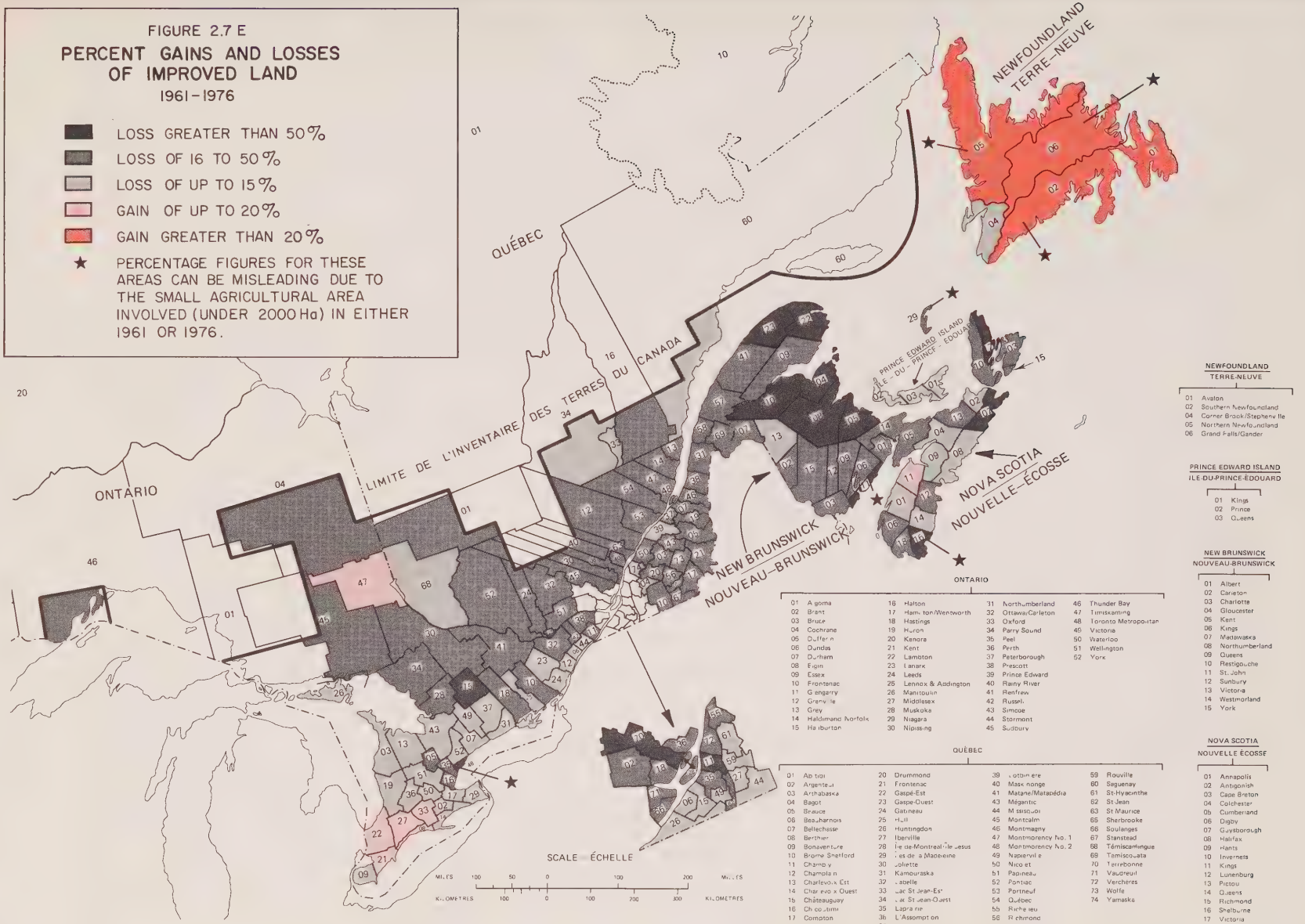
FIGURE 2.7 W
PERCENT GAINS AND LOSSES OF IMPROVED LAND
1961 - 1976
LOSS GREATER THAN 50%
LOSS OF 16 TO 50%
LOSS OF UP TO 15%
GAIN OF UP TO 20%
GAIN GREATER THAN 20%
★ PERCENTAGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO THE SMALL AGRICULTURAL AREA INVOLVED (UNDER 2000 Ha) IN EITHER 1961 OR 1976.
CANADA LAND INVENTORY BOUNDARY
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
ALBERTA
SASKATCHEWAN
MANITOBA
SCALE – ÉCHELLE
MILES 100 50 0 100 200 MILES
KILOMETRES 100 0 100 200 300 KILOMÈTRES
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine
ALBERTA
01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace
SASKATCHEWAN
01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan
MANITOBA
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.7 E

PERCENT GAINS AND LOSSES OF IMPROVED LAND

1961 – 1976

- LOSS GREATER THAN 50%
- LOSS OF 16 TO 50%
- LOSS OF UP TO 15%
- GAIN OF UP TO 20%
- GAIN GREATER THAN 20%
- ★ PERCENTAGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO THE SMALL AGRICULTURAL AREA INVOLVED (UNDER 2000 Ha) IN EITHER 1961 OR 1976.



ONTARIO

01	Algoma	16	Halton	31	Northumberland
02	Brant	17	Hamilton/Wentworth	32	Ottawa/Carleton
03	Bruce	18	Hastings	33	Oxford
04	Cochrane	19	Huron	34	Parry Sound
05	Dufferin	20	Kenora	35	Peel
06	Dundas	21	Kent	36	Perth
07	Durham	22	Lambton	37	Peterborough
08	Elgin	23	Lanark	38	Prescott
09	Essex	24	Leeds	39	Prince Edward
10	Frontenac	25	Lennox & Addington	40	Rainy River
11	Glengarry	26	Manitoulin	41	Renfrew
12	Grenville	27	Middlesex	42	Russell
13	Grey	28	Muskoka	43	Simcoe
14	Haldimand Norfolk	29	Niagara	44	Stormont
15	Haliburton	30	Nipissing	45	Sudbury
				46	Thunder Bay
				47	Timiskaming
				48	Toronto Metropolitan
				49	Victoria
				50	Waterloo
				51	Wellington
				52	York

QUÉBEC

01	Abitibi	20	Drummond	39	Lotbinière
02	Argenteuil	21	Frontenac	40	Maskinongé
03	Arthabaska	22	Gaspé-Est	41	Matane/Matapédia
04	Bagot	23	Gaspé-Ouest	43	Mégantic
05	Beauce	24	Gatineau	44	Missisquoi
06	Beauharnois	25	Hull	45	Montcalm
07	Bellechasse	26	Huntingdon	46	Montmagny
08	Berthier	27	Iberville	47	Montmorency No. 1
09	Bonaventure	28	Ile-de-Montréal/Ile Jésus	48	Montmorency No. 2
10	Brome Shefford	29	Iles de la Madeleine	49	Napierville
11	Chambly	30	Joliette	50	Nicolet
12	Chamolain	31	Kamouraska	51	Papineau
13	Charlevoix Est	32	Labelle	52	Pontiac
14	Charlevoix Ouest	33	Lac St Jean-Est	53	Portneuf
15	Châteauguay	34	Lac St Jean-Ouest	54	Québec
16	Chicoutimi	35	Laprairie	55	Richelieu
17	Compton	36	L'Assomption	56	Richmond
18	Deux-Montagnes	37	Levis	57	Rimouski
19	Dorchester	38	Matane	58	Rivière-du-Loup
				59	Rouville
				60	Saguenay
				61	St-Hyacinthe
				62	St-Jean
				63	St-Maurice
				64	Sherbrooke
				65	Soulanges
				66	Stanstead
				67	Témiscamingue
				68	Témiscouata
				70	Terrebonne
				71	Vaudreuil
				72	Vercheres
				73	Wolfe
				74	Yamaska

NEWFOUNDLAND
TERRE-NEUVE

01	Avalon
02	Southern Newfoundland
04	Corner Brook/Stephenville
05	Northern Newfoundland
06	Grand Falls/Gander

PRINCE EDWARD ISLAND
ÎLE-DU-PRINCE-ÉDOUARD

01	Kings
02	Prince
03	Queens

NEW BRUNSWICK
NOUVEAU-BRUNSWICK

01	Albert
02	Carleton
03	Charlotte
04	Gloucester
05	Kent
06	Kings
07	Madawaska
08	Northumberland
09	Queens
10	Restigouche
11	St. John
12	Sunbury
13	Victoria
14	Westmorland
15	York

NOVA SCOTIA
NOUVELLE ÉCOSSE

01	Annapolis
02	Antigonish
03	Cape Breton
04	Colchester
05	Cumberland
06	Digby
07	Guysborough
08	Halifax
09	Hants
10	Inverness
11	Kings
12	Lunenburg
13	Pictou
14	Queens
15	Richmond
16	Shelburne
17	Victoria
18	Yarmouth

Figures 2.5 and 2.6 portray in map form the location and extent of farmland lost and gained in each part of the nation. The east/west division of the Ontario-Manitoba border provides a pointed demonstration of how the gains in the west are countered by the losses in the east. In both the national and the regional context, the greatest losses of farmland occurred in the Gaspé, the eastern townships of Quebec, New Brunswick, and eastern Ontario; the greatest gains were in the northern prairies and the B.C. interior. Appendix C contains detailed data for farmland losses and gains for each SCD.

Improved Land: Losses and Gains

The change in quantity of improved farmland is a good indication of actively-managed farm production. Gains in improved land demonstrate an intensification of agricultural activity that is usually accompanied by gains in productivity. Despite declines in the total amount of land in Canadian farms, the amount of land under improved agricultural practice has expanded consistently since earliest records. Even more so than with farmland, the east/west division in trends is evident in improved land. Figure 2.7 illustrates that, Newfoundland aside, there is an almost complete division of the nation at the Manitoba-Ontario border, with losses in the east and gains in the west. Nearly all regions of the prairies have reported gains in improved land, the sole exceptions being in the Winnipeg urban region and the foothills of the Rockies. Small losses in improved land in southern British Columbia are also more than offset by gains in northern British Columbia, though not in terms of the type, range, or value of the crops that can be grown.

In the east, the largest losses of improved land were in the Gaspé and the Maritimes. All of Ontario, except Timiskaming and parts of the most intensive agricultural regions of Southern Ontario, also lost improved agricultural land from 1961 to 1976. All SCDs in Quebec reported losses, several in excess of 50% of their 1961 total (see Table 2.1). The only area of the Maritimes that did not report losses was Kings County in the Annapolis Valley. (Refer to Appendix D for a complete list of data on improved land trends.)

The greatest additions of improved agricultural land occurred in the Peace River areas of Alberta and British Columbia, with approximately 566,000 additional hectares and 161,000 hectares respectively (see Table 2.1). Other nationally significant gains in improved agricultural land were reported in many parts of Alberta and Saskatchewan, with land formerly in unimproved pasture being brought into improved pasture and crop production. There were interesting anomalies in parts of central Alberta and Saskatchewan, where losses were reported in total area of farmland simultaneously with increases in the area in improved agricultural practice. This may be the result of some of the poorer land being abandoned, while better agricultural land is brought under improved practice—a trend suggested by the increased capitalization, mechanization, and subsequent productivity increases reported from those regions (Task Force on the Orientation of Canadian Agriculture, 1977, Vol. I, Part A, 45-81).

The ratio of improved land to total farmland steadily increased during the study period in all provinces, with the exception of Newfoundland (see Figure 2.8). This trend constitutes a concentration of farm investment on more suitable land, as well as an intensification of farming practices. Despite the declining farmland base, the overall product obtained from the resource has consistently increased through improvement of land and more intensive management. The value of production per hectare of farmland in Canada was $47.27 in 1961 and $148.50 in 1976 (Task Force on the Orientation of Canadian Agriculture, 1977); when discounted for the 98% inflation over this period, the real value of production per unit area still increased by 63% (Dominion Bureau of Statistics, 1961; Statistics Canada, 1976a).

The Quality and Significance of Losses and Gains

The previous paragraphs have discussed changes in the use of farmland and of improved land over the 15 years from 1961 to 1976. What has not been considered, however, is the relative quality of the land gained and lost. One example of the disappearance of some of Canada's very best and most productive farmland resource is addressed below in the anecdote on the Niagara Fruit Belt. In examining the significance of losses and gains, it is useful to look at the potential productivity of the agro-climatic resource gained or lost.

The ACRI as a Means of Weighting Changes

The Agroclimatic Resource Index (ACRI) is a scale developed to approximate potential agricultural productivity per unit area (Williams, 1975). The scale is based primarily on frost-free season, but it also accommodates measures of moisture deficiency and growing-degree days information. The ACRI base is Essex County, Ontario, because a combination of longest frost-free period, minimal moisture deficiency, and highest growing degree days give the county what is considered to be the best overall potential produc-

Table 2-1

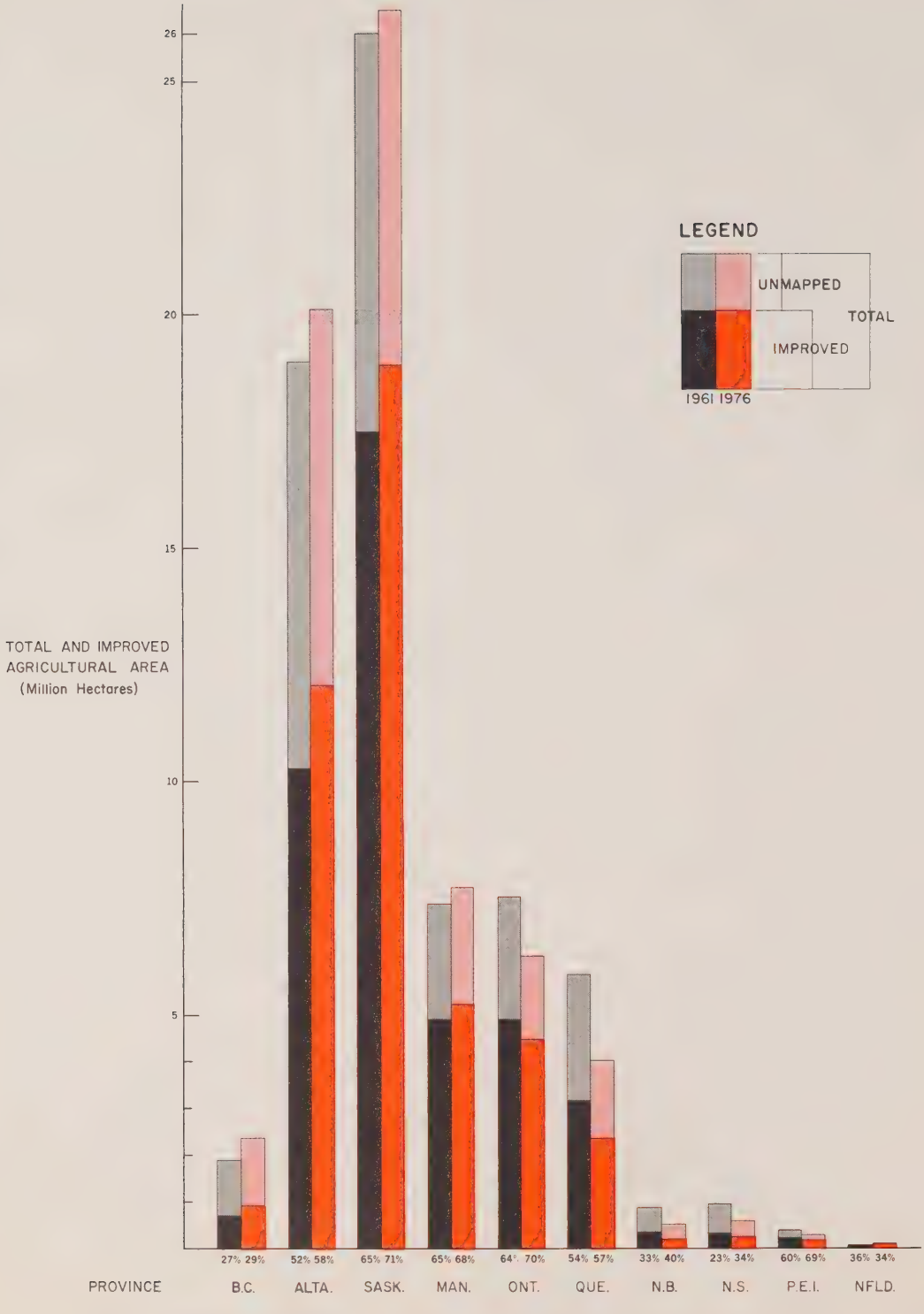
Major Absolute and Percentage Losses and Gains of Improved Land 1961-1976

Major Absolute Losses			High Percentage Losses		
Rank	Area ('000 ha)	%	Rank	Area ('000 ha)	%
1. Brome/Shefford, Quebec	37.3	(-38)	1. Toronto, Ontario	(4.1)	-72
2. Beauce, Quebec	35.0	(-31)	2. Saint John, New Brunswick	(0.9)	-68
3. Abitibi, Quebec	29.7	(-27)	3. Gaspé east, Quebec	(4.4)	-67
4. Grey, Ontario	28.0	(-12)	4. Gaspé west, Quebec	(5.7)	-64
5. Dorchester, Quebec	26.6	(-34)	5. Kent, New Brunswick	(15.6)	-61
6. Ottawa/Carleton, Ontario	25.8	(-20)	6. Shelburne, Nova Scotia	(0.2)	-61
7. Simcoe, Ontario	25.3	(-12)	7. Haliburton, Ontario	(3.5)	-61
8. Nicolet, Quebec	24.1	(-24)	8. Northumberland, New Brunswick	(5.6)	-60
9. Matane/Matapedia, Quebec	22.8	(-25)	9. Victoria, Nova Scotia	(1.7)	-59
10. Renfrew, Ontario	19.9	(-17)	10. Hull, Quebec	(5.2)	-58
Major Absolute Gains			**High Percentage Gains**		
Rank	Area ('000 ha)	%	Rank	Area ('000 ha)	%
1. Peace, Alberta	560.2	(54)	1. Northern Saskatchewan	(5.8)	8,302
2. Lower Qu'Appelle, Saskatchewan	191.9	(23)	2. Skeena-Queen Charlotte	(4.1)	1,285
3. Peace River-Liard, B.C.	171.7	(115)	3. Northern Manitoba	(26.8)	291
4. Pasquia Hills, Saskatchewan	160.1	(16)	4. Fraser-Fort George	(18.8)	148
5. Barrhead, Alberta	160.0	(25)	5. Peace River-Liard	(171.7)	115
6. Davey Thompson, Alberta	140.9	(21)	6. Strait of Belle Isle	(1.0)	96
7. Quill Lakes, Saskatchewan	134.4	(17)	7. Bulkley-Nechako/Stikine	(30.4)	96
8. Wainwright, Alberta	132.7	(13)	8. Grand Falls	(0.5)	88
9. Canora, Saskatchewan	124.2	(16)	9. Edson, Alberta	(28.9)	54
10. Meadow Lake, Saskatchewan	123.7	(22)	10. Peace, Alberta	(560.2)	54

Source: National Data Base.

FIGURE 2.8

IMPROVED TO TOTAL FARMLAND AREA FOR 1961 AND 1976



SOURCE: NATIONAL DATA BASE

The Niagara Fruit Belt: Key Fruit-Production Lands Under Pressure

The fruit belt of the Niagara is a unique Canadian land resource. Extending east from Hamilton to the Niagara River, along the south shore of Lake Ontario, the fruit belt is a narrow strip of frost-sheltered land producing 67% of the value of tender fruit (peaches, pears, cherries) and grape production in Canada (1976). The soils are mainly class 1 and 2, changing from sand underlain by glacial till to a silty-clay loam; the soils are deep, well-drained, and lightly textured. The ameliorating effect of Lake Ontario, mean annual percipitation of 700 millimeters, a frost-free period of 169 days, and warm temperatures over the growing season also contribute to an excellent combination of soil and site for the production of tender fruit.

Agricultural settlement was established early in the Niagara, with a total of 20,000 inhabitants by 1791. The region was also an early entrant into the manufacturing industry. Commercial fruit production, however, did not begin in the Niagara until the late nineteenth-century when the transportation system assured access to larger markets. By 1792 the hydro-electric power of the Niagara was harnessed and high-grade steel mills were brought into production at Welland. The stage was already set for a direct conflict between intensive agricultural, urban, and industrial uses all competing for the same land resource.

Despite its obvious value for tender fruit and grape production, the Niagara has experienced significant declines in agriculture, primarily because of urban and industrial encroachment. From 1961 to 1976, the Niagara regional district lost 23% of its farms and agricultural land declined by 16%, or 33,230 hectares. Tree-fruit and small-fruit producing farms declined 22% and 42% respectively. However, urban and industrial growth increases were in direct contrast to the agricultural decline between 1966 and 1976. Farm values, reflecting the pressures of urban encroachment, increased 511% during the fifteen-year study period.

Of the total land converted to urban uses in the Hamilton and St. Catharines-Niagara urban areas from 1966 to 1976, 84% (7,984 hectares) was class 1-3 soils suitable for agriculture. The largest conversion of class 1 soils was in the Hamilton urban area (999 hectares). In St. Catharines-Niagara, 33% of the land built upon was formerly in orchards and vineyards.

The approval in 1980 of the regional plan on zoning has had some effect, though in areas such as Stoney Creek and West St. Catharines final zoning has been at the expense of high quality fruitlands. While lands here were sacrificed to satisfy urban growth requirements, stringent rural zoning and severance restrictions were placed on the remaining farmland outside the enlarged urban boundaries. Continued urban population and industrial growth will eventually bring further pressure on the enlarged boundaries as well. One solution lies in redirecting growth south of the Niagara escarpment, but local growth ethics have prevented this in the past.

The total areas of land involved are small in the overall Canadian context, but the impact of the loss of unique fruitlands is significant, both regionally and nationally. No viable alternative sites exist in Canada for the production of tender fruits, save the Okanagan Valley where there are similar urban pressures. Attempts to expand peach production into other parts of southern Ontario have failed, chiefly because of winter kill and the apparently climatically-related peach canker. Without effective protection, Canada will soon lose one of its rare renewable resource lands. This loss would directly affect national imports of fresh fruits by removing the present ability to satisfy part of the nation's fresh tender fruit demand.

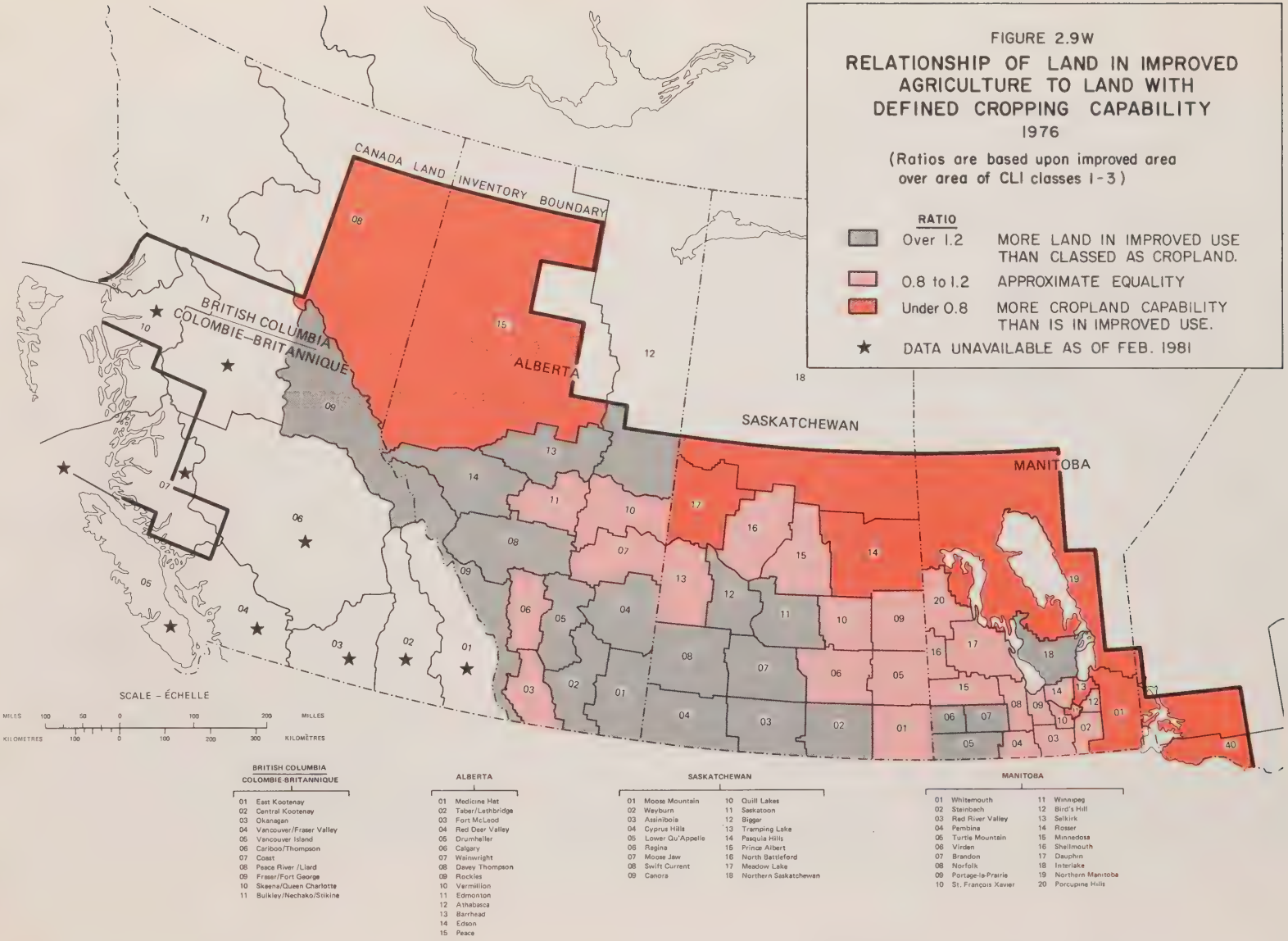


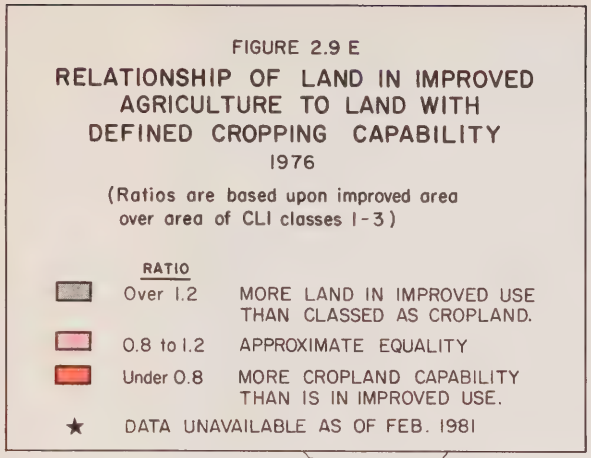
FIGURE 2.9W
RELATIONSHIP OF LAND IN IMPROVED AGRICULTURE TO LAND WITH DEFINED CROPPING CAPABILITY
1976
(Ratios are based upon improved area over area of CLI classes 1-3)
RATIO
Over 1.2 MORE LAND IN IMPROVED USE THAN CLASSED AS CROPLAND.
0.8 to 1.2 APPROXIMATE EQUALITY
Under 0.8 MORE CROPLAND CAPABILITY THAN IS IN IMPROVED USE.
★ DATA UNAVAILABLE AS OF FEB. 1981
CANADA LAND INVENTORY BOUNDARY
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
ALBERTA
SASKATCHEWAN
MANITOBA
SCALE - ÉCHELLE
MILES 100 50 0 100 200 MILLES
KILOMETRES 100 0 100 200 300 KILOMÈTRES
BRITISH COLUMBIA / COLOMBIE-BRITANNIQUE
01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine
ALBERTA
01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace
SASKATCHEWAN
01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan
MANITOBA
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.9 E

RELATIONSHIP OF LAND IN IMPROVED AGRICULTURE TO LAND WITH DEFINED CROPPING CAPABILITY

1976

(Ratios are based upon improved area over area of CLI classes 1-3)



ONTARIO

01 Algoma	16 Halton	31 Northumberland	46 Thunder Bay
02 Brant	17 Hamilton/Wentworth	32 Ottawa/Carleton	47 Timiskaming
03 Bruce	18 Hastings	33 Oxford	48 Toronto Metropolitan
04 Cochrane	19 Huron	34 Parry Sound	49 Victoria
05 Dufferin	20 Kenora	35 Peel	50 Waterloo
06 Dundas	21 Kent	36 Perth	51 Wellington
07 Durham	22 Lambton	37 Peterborough	52 York
08 Elgin	23 Lanark	38 Prescott	
09 Essex	24 Leeds	39 Prince Edward	
10 Frontenac	25 Lennox & Addington	40 Rainy River	
11 Glengarry	26 Manitoulin	41 Renfrew	
12 Grenville	27 Middlesex	42 Russell	
13 Grey	28 Muskoka	43 Simcoe	
14 Haldimand/Norfolk	29 Niagara	44 Stormont	
15 Haliburton	30 Nipissing	45 Sudbury	

QUÉBEC

01 Abitibi	20 Drummond	39 Lotbinière	59 Rouville
02 Argenteuil	21 Frontenac	40 Maskinongé	60 Saguenay
03 Arthabaska	22 Gaspé-Est	41 Matane/Matapédia	61 St-Hyacinthe
04 Bagot	23 Gaspé-Ouest	42 Mégantic	62 St-Jean
05 Beauce	24 Gatineau	43 Maskinongé	63 St-Maurice
06 Beauharnois	25 Hull	44 Masksquoi	64 Sherbrooke
07 Bellechasse	26 Huntingdon	45 Montcalm	65 Soulanges
08 Berthier	27 Iberville	46 Montmagny	66 Stanstead
09 Bonaventure	28 Île-de-Montréal/Île-Jésus	47 Montmorency No. 1	67 Témiscamingue
10 Brome/Shefford	29 Îles-de-la-Madeleine	48 Montmorency No. 2	68 Témiscouata
11 Chambly	30 Joliette	49 Napierville	69 Terrebonne
12 Champlain	31 Kamouraska	50 Nicolet	70 Vaudreuil
13 Charlevoix-Est	32 Labelle	51 Papineau	71 Verchères
14 Charlevoix-Ouest	33 Lac St-Jean-Est	52 Pontiac	72 Wolfe
15 Châteauguay	34 Lac St-Jean-Ouest	53 Portneuf	73 Yamaska
16 Chicoutimi	35 Laprairie	54 Québec	
17 Compton	36 L'Assomption	55 Richelieu	
18 Deux-Montagnes	37 Lévis	56 Richmond	
19 Dorchester	38 L'Islet	57 Rimouski	
		58 Rivière-du-Loup	

NEWFOUNDLAND
TERRE-NEUVE

01	Avalon
02	Southern Newfoundland
04	Corner Brook/Stephenville
05	Northern Newfoundland
06	Grand Falls/Gander

PRINCE EDWARD ISLAND
ILE-DU-PRINCE-ÉDOUARD

01	Kings
02	Prince
03	Queens

NEW BRUNSWICK
NOUVEAU-BRUNSWICK

01	Albert
02	Carleton
03	Charlotte
04	Gloucester
05	Kent
06	Kings
07	Madawaska
08	Northumberland
09	Queens
10	Restigouche
11	St John
12	Sunbury
13	Victoria
14	Westmorland
15	York

NOVA SCOTIA
NOUVELLE-ÉCOSSE

01	Annapolis
02	Antigonish
03	Cape Breton
04	Colchester
05	Cumberland
06	Digby
07	Guysborough
08	Halifax
09	Hants
10	Inverness
11	Kings
12	Lunenburg
13	Pictou
14	Queens
15	Richmond
16	Shelburne
17	Victoria
18	Yarmouth

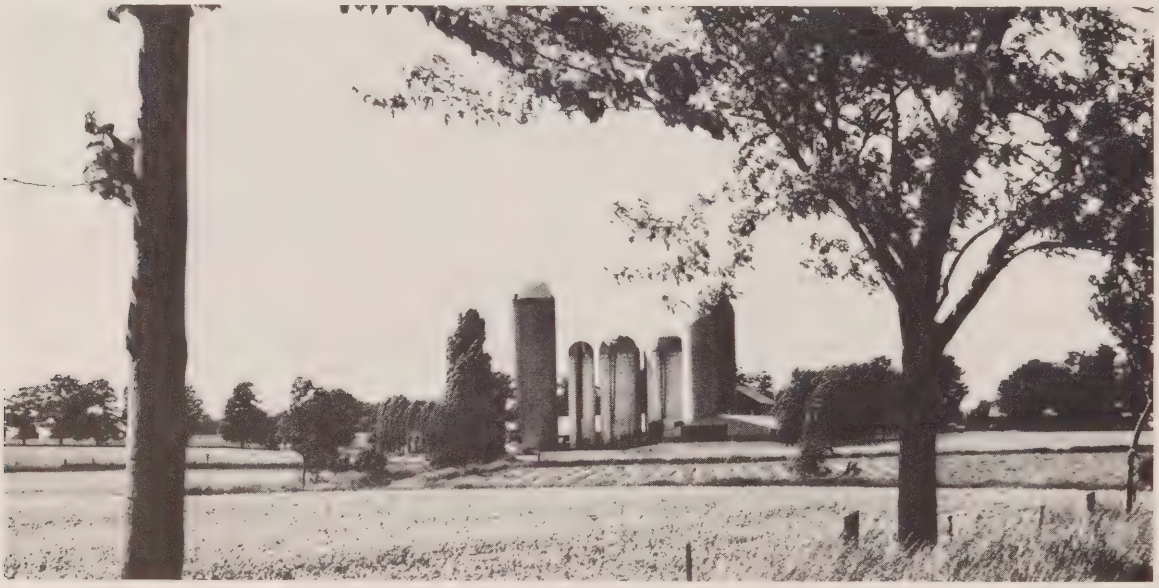
tivity. The ACRI expresses productivity for any area with agricultural potential in terms of a numerical relationship to Essex County, beginning with 3.0 and declining to approximately 1.0 on the northern agricultural frontier. Table 2.2 shows the relative capabilities of the agricultural resources of Canada's regions rated through the ACRI (taken from Simpson-Lewis, *et al.*, 1979).

While the index does subsume variations in soil capability, it correlates exceptionally well with the productivity per hectare of hay. The ACRI is a general scale that does not, however, accommodate the particular needs of specialty crops. The clearest definition of the ACRI and its use can be found in *Canada's Special Resource Lands*:

> To further illustrate the need to consider agroclimatic resources in analysing farmland losses, the term "Agroclimatic Resource Hectare", or ACRH, was coined. This is the product of the ACRI value and the number of ha of farmland. ACRH was calculated for selected census divisions for purposes of comparison. Here is an example. Between 1961 and 1971, in Alberta Census Division No. 13, total farmland increased by 76,704 ha. During this same period, total farmland in York and Peel census divisions in Ontario decreased by 23,134 and 17,945 ha respectively. From a strictly statistical point of view, it would appear that the one Alberta census division's gain of 76,704 would more than compensate for the two Ontario divisions' loss of 41,079 ha. But, the 2.5 ACRI value of land in York and Peel is more than twice the value of 1.2 in Alberta's Census Division No. 13. The relative gain in agricultural land resources in this latter division, taking the climate into account was ACRH = 1.2 X 76,704 = 92,045. The relative loss in York and Peel was ACRH = 2.5 X 41,079 = 102,698. Thus, the agroclimatic land resource loss in the two census divisions in Ontario was greater than the gain in Alberta's Census Division No. 13. (Simpson-Lewis, *et al.*, 1979, 17).

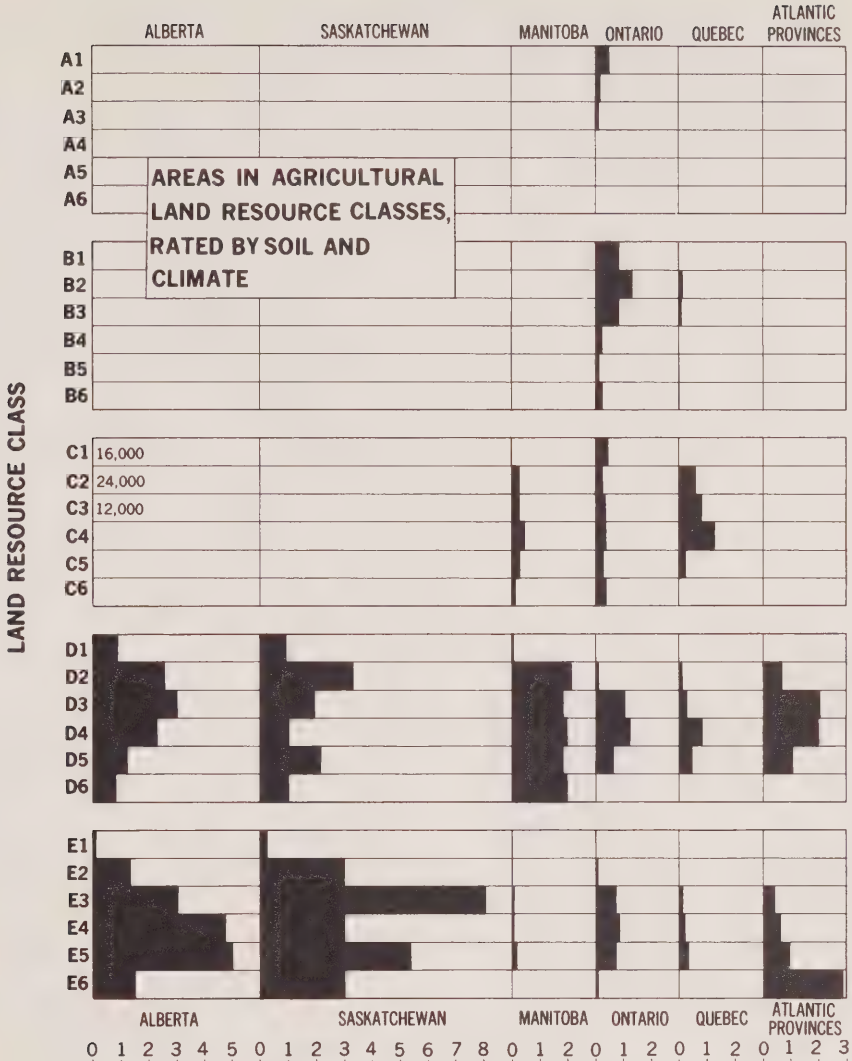
For this paper, a series of calculations similar to those cited above were performed for each of the SCDs, yielding a net national result different from that based on the raw figures on losses and gains (see Figure 2.11).

The data on farmland change show a national loss of 1.4 million hectares, or 2.0% of the 1961 farmland base, from 1961 to 1976. In contrast, when potential productivity is taken into account through the ACRI, the national loss grows to 4.6 million ACRH, or 3.9% of the 1961 agricultural productivity potential of the



A dairy farm on high capability land near Woodstock, Ontario.
E.W. Manning

TABLE 2.2



AREAS IN AGRICULTURAL LAND RESOURCE CLASSES, RATED BY SOIL AND CLIMATE

The agroclimatic resource classes, with the corresponding ACRI values and typifying areas, are as follows:

A (ACRI ⩾3) Essex and Kent Counties, Ont.

B (ACRI 2.5 to 2.9) SW. Ont., areas near Lake Ontario and Georgian Bay, W. part of Montreal Plain.

C (ACRI 2.0 to 2.4) Lower Fraser Valley and Victoria area. Manitoba Plain N. of Winnipeg and Portage. Central Ont., Ottawa Valley, Manitoulin Is. Central St. Lawrence Lowlands of Que.

D (ACRI 1.5 to 1.9) S. interior valleys of B.C. and Vancouver Is. Parts of Upper Peace R. Valley, about half of the part of S. Alta. lying along and E. of an Edmonton-Calgary-Lethbridge line. Most of Sask. S. of Pr. Albert and E. of a North Battleford-Regina-Weyburn line. Most of Man. Plain and Interlake area. Thunder Bay, Algonquin Park and Clay Belt areas of Ont. Lac St. Jean and Riv. du Loup areas and area E. of Sherbrooke, Que. P.E.I., N.S. and S. part of N.B.

E (ACRI 1.0 to 1.4) N. interior valleys of B.C. Most of Peace and Athabasca River Valleys, parts of SE. Alta. Most of Sask. N. of Pr. Albert and Sask. W. of a North Battleford-Regina-Weyburn line. Riding and Duck Mts. in Man. Abitibi and Laurentides areas of Que. NW., NB. Most of Is. of Nfld.

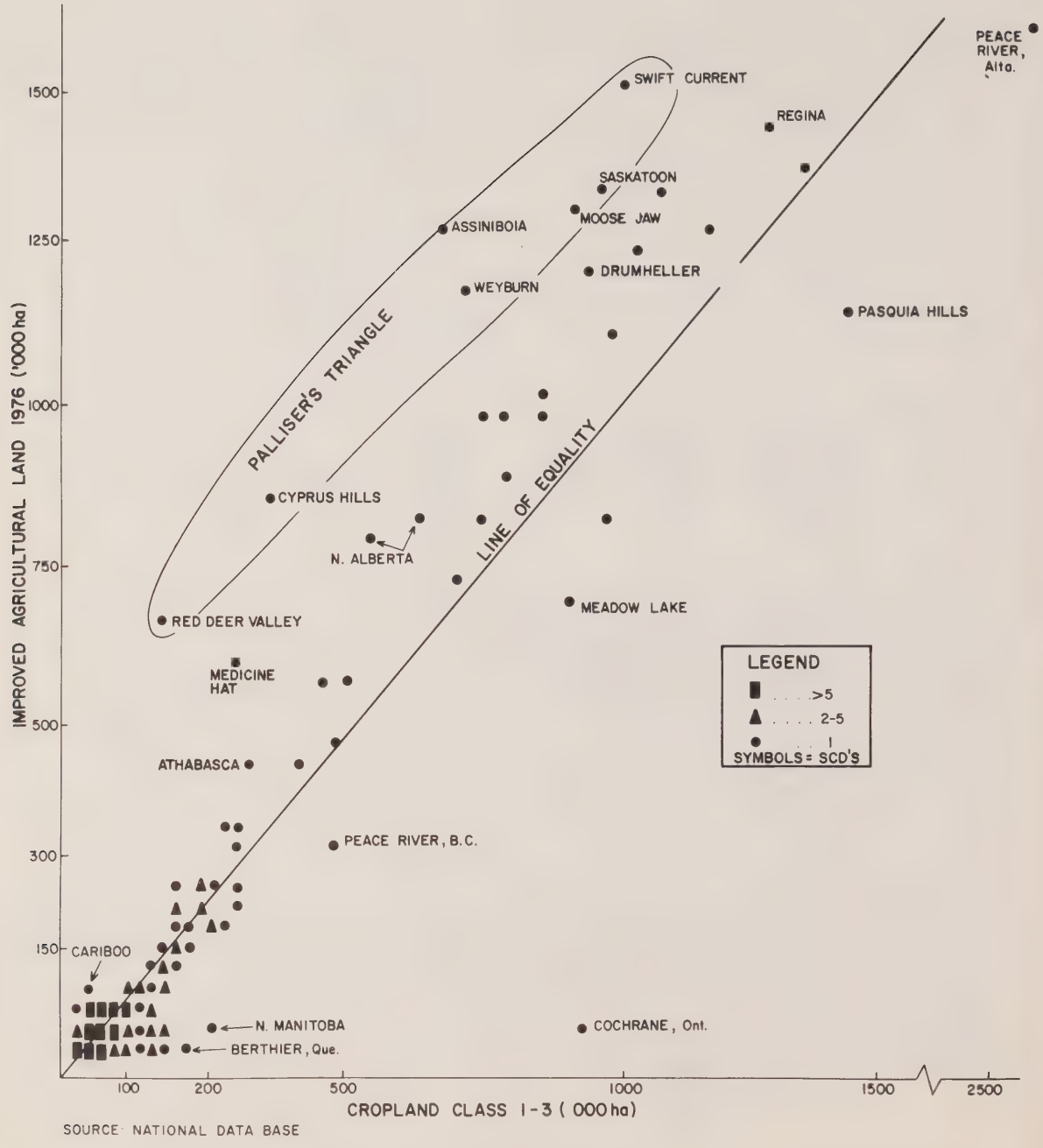
The soil capability classes rate soils as follows:

1. No limitations for general field crops
2. Moderate limitations that restrict range of crops or require moderate conservation practices.
3. Moderately severe limitations.
4. Severe limitations; suitable for only a few crops, or else the yield for a range of crops is low, or high risk of crop failure
5. Perennial forage at best, but improvements feasible
6. Perennial forage, improvements not feasible

Data is not yet available for British Columbia; estimates for B.C. are 70,000 ha in Class 1, 398,000 ha in Class 2, 1 million ha in Class 3, 2.1 million ha in Class 4, 12 million ha in Class 5, 11 million ha in Class 6.

FIGURE 2.10

RELATIONSHIP OF IMPROVED AGRICULTURAL LAND TO CROPPING POTENTIAL 1976



SOURCE: NATIONAL DATA BASE

nation. Thus the significant westward shift in farmland has occurred at the expense of the versatility in crop production of the country's agricultural base.

The Capability of Land Lost and Gained (The CLI)

Another means of assessing changes in the use of the agricultural resource is to compare actual land use with the agricultural capability of that land. The Canada Land Inventory (CLI) measures the area of land capable of crop production (agricultural land classes 1, 2, and 3). In Figure 2.9, actual land use is related to land capability for each SCD and the ratios between the two amounts are calculated. The comparison is a crude measure, because there is no assurance that the land capable of agriculture is being so used, nor is there an assurance that the land not theoretically capable of crop production is not, at least temporarily, being used for that activity.

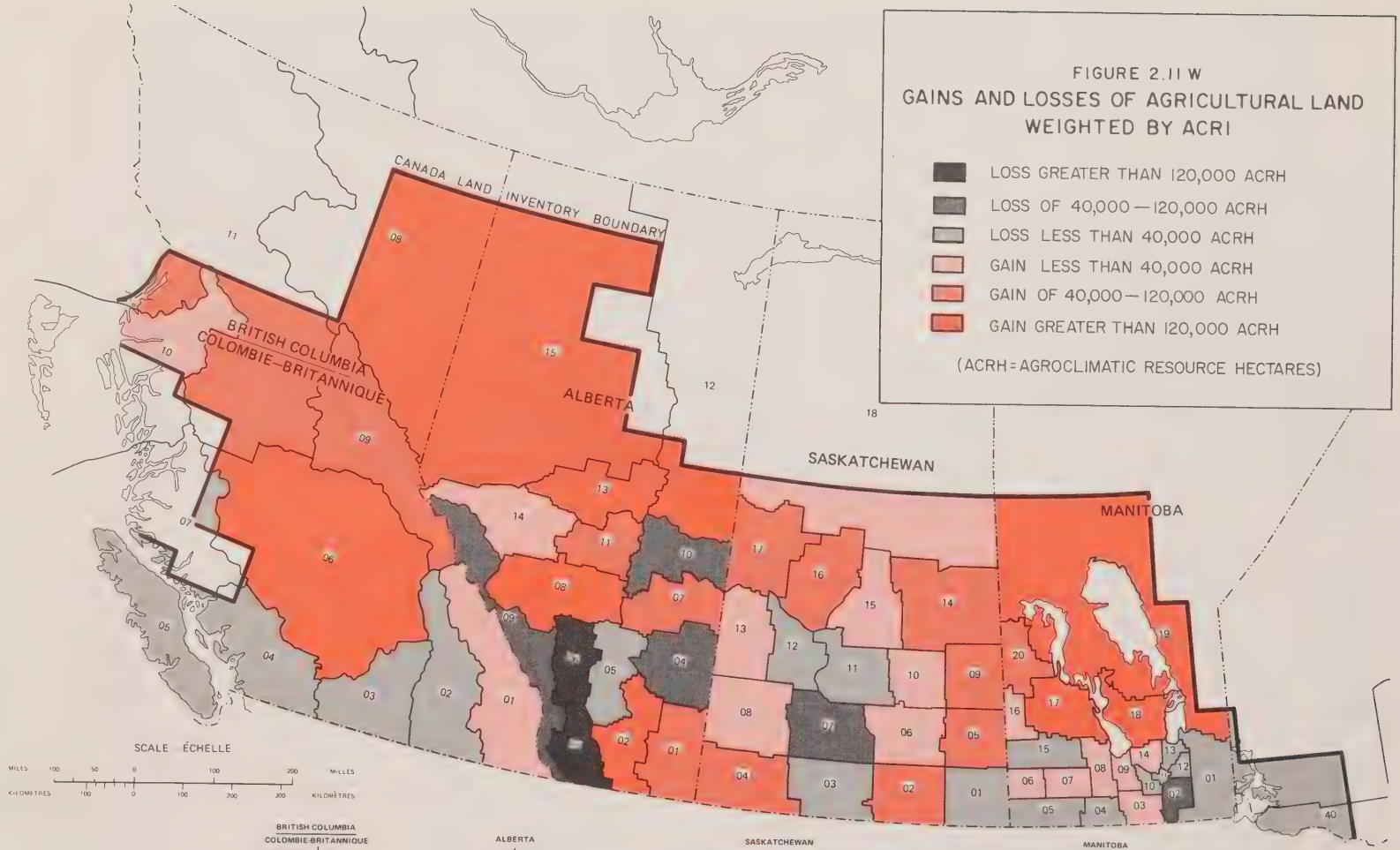
For each census year from 1961 to 1976, a simple ratio has been calculated by dividing the total area of improved farmland by the area classified as cropland in the same SCD. As would be expected, on the national scale there is a substantial positive correlation between the two figures; in fact, for those areas that have been classified under the CLI, a correlation coefficient (Pearson's R) of .924 was obtained for 1976. This indicates a significant correspondence between land with crop capability and that used for improved agriculture in 1976. Figure 2.10 shows some interesting anomalies to this relationship as those SCDs most distant from the line of equality, which represents the points where the amount of potential cropland equals the amount in improved agricultural use.

Those anomalies identified as having substantially more land in improved agricultural practice than area with supposed cropping potential correspond to Palliser's Triangle in Figure 2.10. The apparent excess noted here could be largely due to irrigation which permits improved agriculture on land of lower agricultural capability. In parts of Quebec, such as the Eastern Townships and the Beauce (areas of cropland loss 1961-76), earlier settlement may have exceeded the limits of long-term cropping potential.

These same data also indicate areas of Canada where still untapped agricultural potential may lie. Notable among these are the Peace River areas of Alberta and B.C., parts of northern Saskatchewan, and the Cochrane region of northern Ontario. These are generally regions where future agricultural expansion could be contemplated, providing that local factors, such as remoteness, scattered pockets of high capability land, and climatic limitations, that have prevented their use can be overcome (e.g., as they have been in the Peace area).

While there is a substantial national correlation between the land with agricultural potential (Classes 1 to 3) and land already in use (census), there is far less correspondence between the areas gaining and losing land in improved agricultural practice and land quality. From 1961 to 1976, the national correlation co-efficient between potential cropland and the area in improved agriculture changed from .894 to .924 showing an increased correlation between agricultural use and good farmland. However, if SCDs are analyzed individually, it is evident that in many areas the degree of this relationship has been altered; for example, in the Gaspé and northern New Brunswick, the retreat of agricultural use has not only involved poorer land, but also areas of higher quality agricultural land. The withdrawal of agriculture from good farmland is also pronounced in the rest of the Maritimes and the Eastern Townships of Quebec (see Table 2.3).

Abandoned lower capability land near Vankleek Hill, Ontario.
E.W. Manning



BRITISH COLUMBIA / COLOMBIE-BRITANNIQUE

01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine

ALBERTA

01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace

SASKATCHEWAN

01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan

MANITOBA

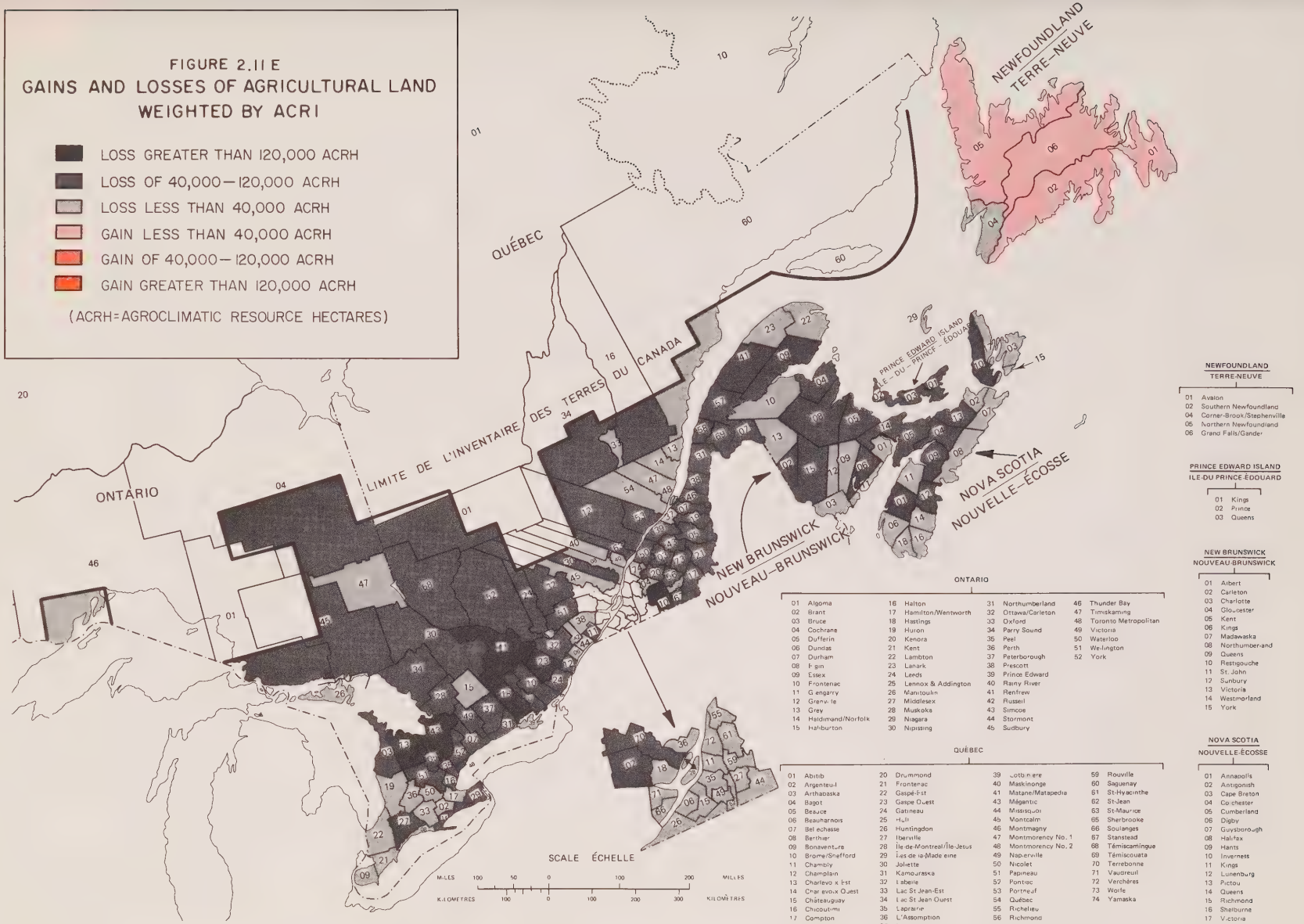
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage la Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.11 E

GAINS AND LOSSES OF AGRICULTURAL LAND WEIGHTED BY ACRI

- LOSS GREATER THAN 120,000 ACRH
- LOSS OF 40,000 – 120,000 ACRH
- LOSS LESS THAN 40,000 ACRH
- GAIN LESS THAN 40,000 ACRH
- GAIN OF 40,000 – 120,000 ACRH
- GAIN GREATER THAN 120,000 ACRH

(ACRH=AGROCLIMATIC RESOURCE HECTARES)



NEWFOUNDLAND / TERRE-NEUVE

01 Avalon
02 Southern Newfoundland
04 Corner-Brook/Stephenville
05 Northern Newfoundland
06 Grand Falls/Gander

PRINCE EDWARD ISLAND / ÎLE-DU-PRINCE-ÉDOUARD

01 Kings
02 Prince
03 Queens

NEW BRUNSWICK / NOUVEAU-BRUNSWICK

01 Albert
02 Carleton
03 Charlotte
04 Gloucester
05 Kent
06 Kings
07 Madawaska
08 Northumberland
09 Queens
10 Restigouche
11 St. John
12 Sunbury
13 Victoria
14 Westmorland
15 York

NOVA SCOTIA / NOUVELLE-ÉCOSSE

01 Annapolis
02 Antigonish
03 Cape Breton
04 Colchester
05 Cumberland
06 Digby
07 Guysborough
08 Halifax
09 Hants
10 Inverness
11 Kings
12 Lunenburg
13 Pictou
14 Queens
15 Richmond
16 Shelburne
17 Victoria
18 Yarmouth

ONTARIO

01 Algoma
02 Brant
03 Bruce
04 Cochrane
05 Dufferin
06 Dundas
07 Durham
08 Elgin
09 Essex
10 Frontenac
11 Glengarry
12 Grenville
13 Grey
14 Haldimand/Norfolk
15 Haliburton
16 Halton
17 Hamilton/Wentworth
18 Hastings
19 Huron
20 Kenora
21 Kent
22 Lambton
23 Lanark
24 Leeds
25 Lennox & Addington
26 Manitoulin
27 Middlesex
28 Muskoka
29 Niagara
30 Nipissing
31 Northumberland
32 Ottawa/Carleton
33 Oxford
34 Parry Sound
35 Peel
36 Perth
37 Peterborough
38 Prescott
39 Prince Edward
40 Rainy River
41 Renfrew
42 Russell
43 Simcoe
44 Stormont
45 Sudbury
46 Thunder Bay
47 Timiskaming
48 Toronto Metropolitan
49 Victoria
50 Waterloo
51 Wellington
52 York

QUÉBEC

01 Abitibi
02 Argenteuil
03 Arthabaska
04 Bagot
05 Beauce
06 Beauharnois
07 Bellechasse
08 Berthier
09 Bonaventure
10 Brome/Shefford
11 Chambly
12 Champlain
13 Charlevoix Est
14 Charlevoix Ouest
15 Châteauguay
16 Chicoutimi
17 Compton
18 Deux Montagnes
19 Dorchester
20 Drummond
21 Frontenac
22 Gaspé-Est
23 Gaspe Ouest
24 Gatineau
25 Hull
26 Huntingdon
27 Iberville
28 Île-de-Montreal/Île-Jesus
29 Îles-de-la-Madeleine
30 Joliette
31 Kamouraska
32 Labelle
33 Lac St Jean-Est
34 Lac St Jean Ouest
35 Laprairie
36 L'Assomption
37 Levis
38 L'Islet
39 Lotbinière
40 Maskinonge
41 Matane/Matapedia
42 Mégantic
43 Missisquoi
44 Montcalm
45 Montmagny
46 Montmorency No. 1
47 Montmorency No. 2
48 Napierville
49 Nicolet
50 Papineau
51 Pontiac
52 Portneuf
53 Québec
54 Richelieu
55 Richmond
56 Rimouski
57 Rivière-du-Loup
58 Rouville
59 Saguenay
60 St-Hyacinthe
61 St-Jean
62 St-Maurice
63 Sherbrooke
64 Soulanges
65 Stanstead
66 Témiscamingue
67 Témiscouata
68 Terrebonne
69 Vaudreuil
70 Verchères
71 Wolfe
72 Yamaska

Table 2.3

Selected Examples of the Trends in Improved Land Use Relative to Land with Defined Cropping Capability* 1961-1976

Standardized Census Division \ Ratio of Improved Land to Cropping Capability	1961	1966	1971	1976
Témiscamingue, Quebec	2.209	2.408	2.151	1.938
Saguenay, Quebec	1.485	1.817	1.413	1.354
Saskatoon, Saskatchewan	1.284	1.325	1.294	1.329
Interlake, Manitoba	.925	1.047	1.240	1.303
Berthier, Quebec	1.501	1.410	1.347	1.261
Calgary, Alberta	1.002	1.049	1.059	1.067
Steinbach, Manitoba	1.053	1.065	1.053	1.051
Rosser, Manitoba	.930	.962	.987	1.008
Bruce, Ontario	.893	.899	.846	.868
Grey, Ontario	.910	.900	.799	.798
Essex, Ontario	.808	.796	.773	.791
Meadow Lake, Saskatchewan	.610	.668	.715	.742
Peace, Alberta	.444	.534	.631	.684
Peace River/Laird, British Columbia	.305	.468	.629	.665
Kings, Nova Scotia	.498	.541	.499	.516
Annapolis, Nova Scotia	.502	.529	.425	.493
Matane/Matapédia, Quebec	.626	.616	.512	.469
Gaspé Ouest, Quebec	1.160	.876	.622	.418
Rainy River, Ontario	.210	.227	.190	.235
Northern Manitoba, Manitoba	.036	.092	.114	.142
Hants, Nova Scotia	.137	.136	.115	.130
Gaspé, Est, Quebec	.189	.159	.099	.63
Kenora, Ontario	.043	.044	.037	.041
Northern Saskatchewan, Saskatchewan	.001	.002	.015	.040
Toronto Metropolitan, Ontario	.125	.110	.048	.035
Cochrane, Ontario	.034	.032	.019	.024

Correlation Coefficients: (National)
1961 = .894
1966 = .906
1971 = .920
1976 = .924

* Ratios are based on Improved Area over area of CLI Classes 1-3.

SOURCE: National Data Base.

The national data show a trend in most areas towards using those lands with cropland potential for improved agriculture. But there is also unused some regional significance in parts of Ontario, Quebec, and the Maritimes, where there is increasing farmland abandonment.

The Changing Farm

The changes in agricultural land use observed in the preceding paragraphs have been accompanied by substantial modifications in farm characteristics and farm numbers. In 1961, one Canadian in 38 was a farmer. By 1976, this had dropped to one person in 75. Between 1961 and 1976, there were 142,325 fewer farms, a reduction of 30% of the 1961 total. This represents about 142,000 fewer farmers, a significant loss in skills and capabilities.

Figure 2.12 shows the main areas where there have been substantial losses and gains in numbers of farms. Of particular note are the losses in the Gaspé and northern New Brunswick, where over two-thirds of the farms were lost. In these areas, and in parts of Nova Scotia and the Abitibi region of Quebec, the losses in the numbers of farmers have been accompanied by major losses in farmland area (see Figure 2.6). In percentage terms, the numbers of farms lost is greater than the farmland lost, indicating both an abandonment of marginal lands and, at the same time, a degree of farm consolidation. In all of these cases, and indeed throughout eastern Canada, there has been a significant reduction in the number of farms; specifically, it should be noted that no census area east of the Manitoba-Ontario border reported an increase in the number of farms. The major reductions in farm numbers were in the physically marginal regions of the east and in some regions immediately surrounding such urban centres as Winnipeg, Toronto, Montreal, and Ottawa/Hull.

With the exceptions of northern Manitoba and the interior and northern areas of British Columbia, few areas showed net gains in farm numbers from 1961 to 1976. There is no direct correlation between the changes in farm numbers and expanding farmland area in the west. Areas of northern Alberta and Saskatchewan lost farms while gaining farmland area, evidence of the national trend towards farm consolidation.

In examining the trend towards farm consolidation, it is useful to study changes in the size of farm units over the period from 1961 to 1976. The size of the average farm in Canada rose from 145 hectares in 1961 to 164 hectares in 1966, to 188 hectares in 1971, and to 202 hectares in 1976. All provinces showed increases in average farm size from 1961 to 1976; the areas with the most rapid increases can be categorized into two groups, both occupying peripheral parts of the nation's agricultural ecumene. The first group is located in the advancing frontier areas of the northern prairies and British Columbia, where gains of over 50% in farm size have been reported (see Figure 2.13). New large-scale farming operations are being established and expanded at the same time as previously existing farms are being consolidated. The second group can be characterized as areas of rapid farmland abandonment—the Gaspé, northern New Brunswick, the Ontario-Quebec clay belt, and the north shore of the St. Lawrence. Substantial losses in the percentage of agricultural land and in the number of census farms in these areas were concomitant with increases in average farm size. Farm consolidation apparently occurred on farmland that remained in production. Again, Newfoundland appears as an anomaly, since the reported expansion in average farm area was due primarily to the establishment of extensive community pastures in most regions and not to the creation or expansion of individual commercial farms.

Some areas of Canada reported net reductions in average farm size from 1961 to 1976; these include Vancouver Island, the Okanagan Valley of British Columbia, the region surrounding Calgary, the area north of the Great Lakes in Ontario, Muskoka and Haliburton, and a number of urban-related areas in the east. In more remote areas, such as Sudbury-Sault Ste. Marie, the reported reductions in average farm size are likely a result of the retreat by farm occupants from marginal farmland. Around urban centres, the decline in average farm size could relate to rural recreation and hobby farming, as well as to such intensive uses of farmland as market gardening, orchards, etc. Many of the smaller, rural residential estates and hobby farms produce enough to qualify as census farm units, so that if the data for these quasi-farm units were removed, a consolidation of commercial farms similar to that in other parts of the nation would likely be evident.

The Value of Farmland

It has been said that land is as good as gold. In fact, census figures indicate that an investment of $100,000 in Canadian farmland in 1961 would, with an average amount of improvement, be worth $417,000 by 1976 and would exceed $500,000 by 1980 (Manning and McCuaig, 1979). Investments in some urban-related areas would have brought even higher returns and

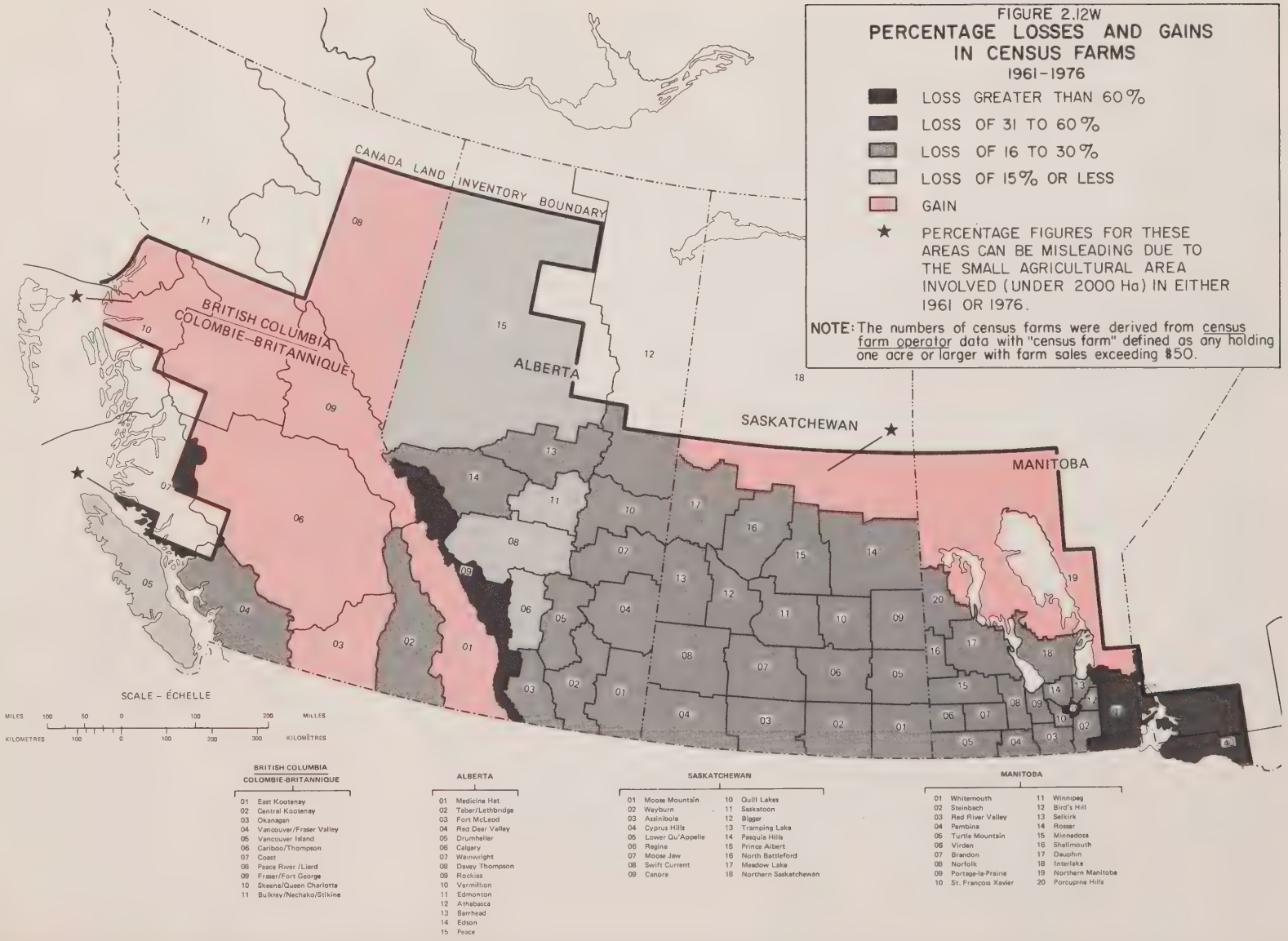


FIGURE 2.12W
PERCENTAGE LOSSES AND GAINS IN CENSUS FARMS
1961-1976
LOSS GREATER THAN 60%
LOSS OF 31 TO 60%
LOSS OF 16 TO 30%
LOSS OF 15% OR LESS
GAIN
★ PERCENTAGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO THE SMALL AGRICULTURAL AREA INVOLVED (UNDER 2000 Ha) IN EITHER 1961 OR 1976.
NOTE: The numbers of census farms were derived from census farm operator data with "census farm" defined as any holding one acre or larger with farm sales exceeding $50.
CANADA LAND INVENTORY BOUNDARY
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
ALBERTA
SASKATCHEWAN
MANITOBA
SCALE - ÉCHELLE
MILES 100 50 0 100 200 MILLES
KILOMETRES 100 0 100 200 300 KILOMÈTRES
BRITISH COLUMBIA / COLOMBIE-BRITANNIQUE
01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine
ALBERTA
01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Dovey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace
SASKATCHEWAN
01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cyprus Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan
MANITOBA
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

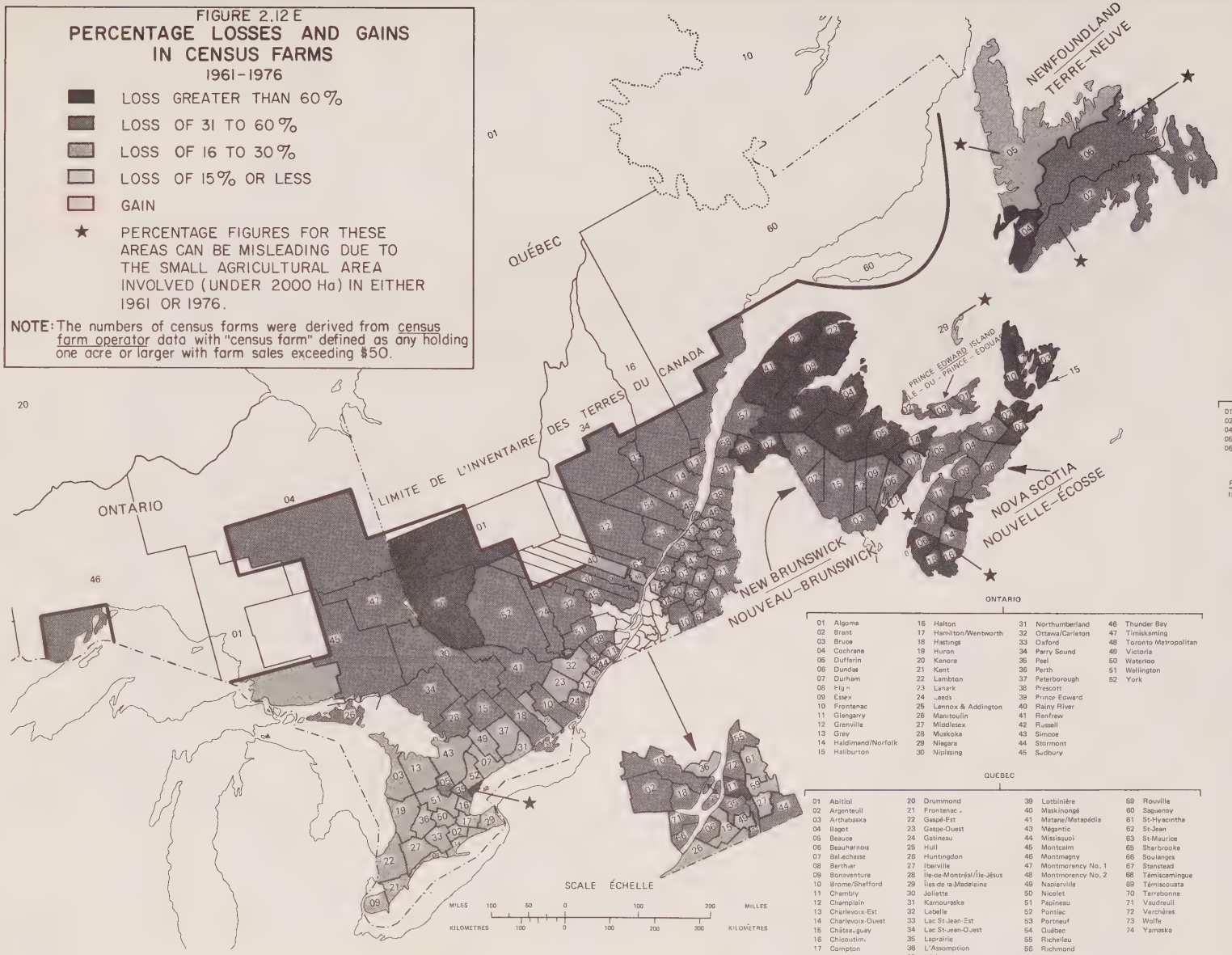
FIGURE 2.12 E

PERCENTAGE LOSSES AND GAINS IN CENSUS FARMS

1961–1976

- LOSS GREATER THAN 60%
- LOSS OF 31 TO 60%
- LOSS OF 16 TO 30%
- LOSS OF 15% OR LESS
- GAIN
- ★ PERCENTAGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO THE SMALL AGRICULTURAL AREA INVOLVED (UNDER 2000 Ha) IN EITHER 1961 OR 1976.

NOTE: The numbers of census farms were derived from census farm operator data with "census farm" defined as any holding one acre or larger with farm sales exceeding $50.



ONTARIO

01	Algoma	16	Halton	31	Northumberland
02	Brant	17	Hamilton/Wentworth	32	Ottawa/Carleton
03	Bruce	18	Hastings	33	Oxford
04	Cochrane	19	Huron	34	Parry Sound
05	Dufferin	20	Kenora	35	Peel
06	Dundas	21	Kent	36	Perth
07	Durham	22	Lambton	37	Peterborough
08	Elgin	23	Lanark	38	Prescott
09	Essex	24	Leeds	39	Prince Edward
10	Frontenac	25	Lennox & Addington	40	Rainy River
11	Glengarry	26	Manitoulin	41	Renfrew
12	Grenville	27	Middlesex	42	Russell
13	Grey	28	Muskoka	43	Simcoe
14	Haldimand/Norfolk	29	Niagara	44	Stormont
15	Haliburton	30	Nipissing	45	Sudbury
				46	Thunder Bay
				47	Timiskaming
				48	Toronto Metropolitan
				49	Victoria
				50	Waterloo
				51	Wellington
				52	York

QUÉBEC

01	Abitibi	20	Drummond	39	Lotbinière
02	Argenteuil	21	Frontenac	40	Maskinongé
03	Arthabaska	22	Gaspé-Est	41	Matane/Matapédia
04	Bagot	23	Gaspé-Ouest	43	Mégantic
05	Beauce	24	Gatineau	44	Missisquoi
06	Beauharnois	25	Hull	45	Montcalm
07	Bellechasse	26	Huntingdon	46	Montmagny
08	Berthier	27	Iberville	47	Montmorency No. 1
09	Bonaventure	28	Île-de-Montréal/Île-Jésus	48	Montmorency No. 2
10	Brome/Shefford	29	Îles-de-la-Madeleine	49	Napierville
11	Chambly	30	Joliette	50	Nicolet
12	Champlain	31	Kamouraska	51	Papineau
13	Charlevoix-Est	32	Labelle	52	Pontiac
14	Charlevoix-Ouest	33	Lac St-Jean-Est	53	Portneuf
15	Châteauguay	34	Lac St-Jean-Ouest	54	Québec
16	Chicoutimi	35	Laprairie	55	Richelieu
17	Compton	36	L'Assomption	56	Richmond
18	Deux-Montagnes	37	Lévis	57	Rimouski
19	Dorchester	38	L'Islet	58	Rivière du Loup
				69	Rouville
				60	Saguenay
				61	St-Hyacinthe
				62	St-Jean
				63	St-Maurice
				65	Sherbrooke
				66	Soulanges
				67	Stanstead
				68	Témiscamingue
				69	Témiscouata
				70	Terrebonne
				71	Vaudreuil
				72	Verchères
				73	Wolfe
				74	Yamaska

NEWFOUNDLAND
TERRE-NEUVE

01	Avalon
02	Southern Newfoundland
04	Corner-Brook/Stephenville
05	Northern Newfoundland
06	Grand Falls/Gander

PRINCE EDWARD ISLAND
ILE-DU-PRINCE ÉDOUARD

01	Kings
02	Prince
03	Queens

NEW BRUNSWICK
NOUVEAU-BRUNSWICK

01	Albert
02	Carleton
03	Charlotte
04	Gloucester
05	Kent
06	Kings
07	Madawaska
08	Northumberland
09	Queens
10	Restigouche
11	St John
12	Sunbury
13	Victoria
14	Westmorland
15	York

NOVA SCOTIA
NOUVELLE-ÉCOSSE

01	Annapolis
02	Antigonish
03	Cape Breton
04	Colchester
05	Cumberland
06	Digby
07	Guysborough
08	Halifax
09	Hants
10	Inverness
11	Kings
12	Lunenburg
13	Pictou
14	Queens
15	Richmond
16	Shelburne
17	Victoria
18	Yarmouth

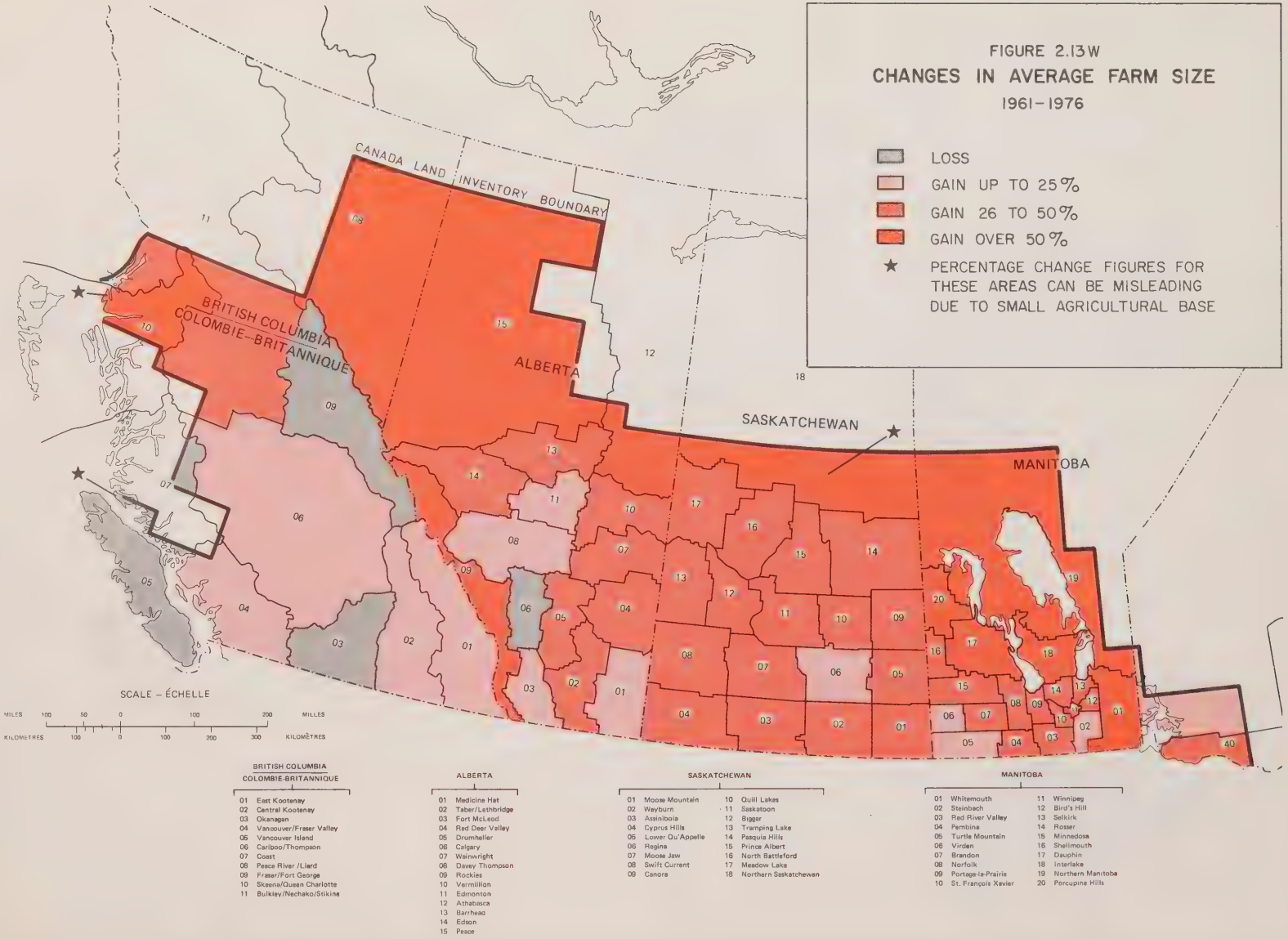


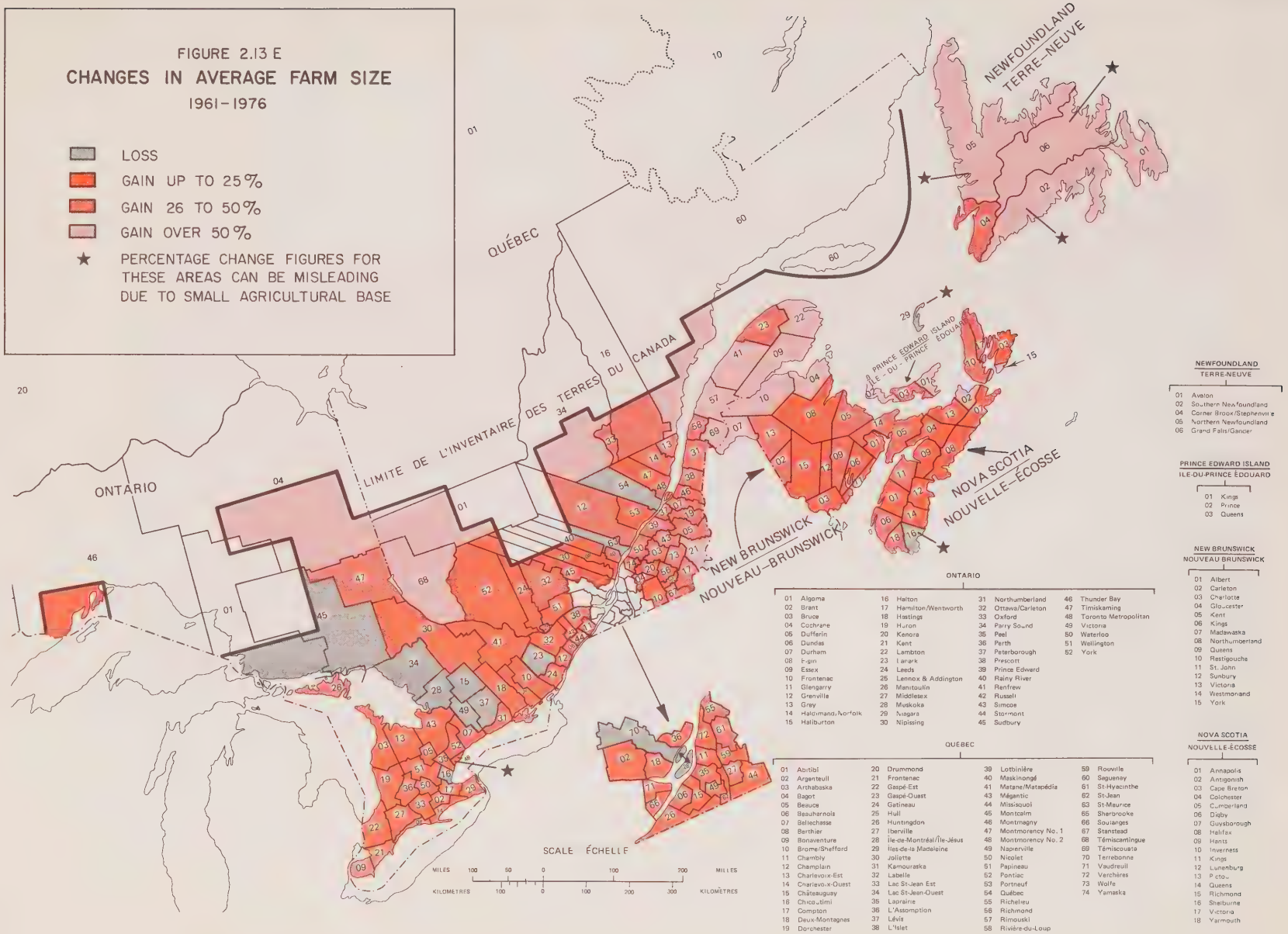
FIGURE 2.13W
CHANGES IN AVERAGE FARM SIZE
1961–1976
LOSS
GAIN UP TO 25%
GAIN 26 TO 50%
GAIN OVER 50%
★ PERCENTAGE CHANGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO SMALL AGRICULTURAL BASE
CANADA LAND INVENTORY BOUNDARY
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
ALBERTA
SASKATCHEWAN
MANITOBA
SCALE – ÉCHELLE
MILES 100 50 0 100 200 MILES
KILOMETRES 100 0 100 200 300 KILOMÈTRES
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine
ALBERTA
01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace
SASKATCHEWAN
01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Bigger
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan
MANITOBA
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.13 E

CHANGES IN AVERAGE FARM SIZE

1961–1976

- LOSS
- GAIN UP TO 25%
- GAIN 26 TO 50%
- GAIN OVER 50%
- ★ PERCENTAGE CHANGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO SMALL AGRICULTURAL BASE



ONTARIO

01	Algoma	16	Halton	31	Northumberland
02	Brant	17	Hamilton/Wentworth	32	Ottawa/Carleton
03	Bruce	18	Hastings	33	Oxford
04	Cochrane	19	Huron	34	Parry Sound
05	Dufferin	20	Kenora	35	Peel
06	Dundas	21	Kent	36	Perth
07	Durham	22	Lambton	37	Peterborough
08	Elgin	23	Lanark	38	Prescott
09	Essex	24	Leeds	39	Prince Edward
10	Frontenac	25	Lennox & Addington	40	Rainy River
11	Glengarry	26	Manitoulin	41	Renfrew
12	Grenville	27	Middlesex	42	Russell
13	Grey	28	Muskoka	43	Simcoe
14	Haldimand/Norfolk	29	Niagara	44	Stormont
15	Haliburton	30	Nipissing	45	Sudbury
				46	Thunder Bay
				47	Timiskaming
				48	Toronto Metropolitan
				49	Victoria
				50	Waterloo
				51	Wellington
				52	York

QUÉBEC

01	Abitibi	20	Drummond	39	Lotbinière
02	Argenteuil	21	Frontenac	40	Maskinongé
03	Arthabaska	22	Gaspé-Est	41	Matane/Matapédia
04	Bagot	23	Gaspé-Ouest	43	Mégantic
05	Beauce	24	Gatineau	44	Missisquoi
06	Beauharnois	25	Hull	45	Montcalm
07	Bellechasse	26	Huntingdon	46	Montmagny
08	Berthier	27	Iberville	47	Montmorency No. 1
09	Bonaventure	28	Île-de-Montréal/Île-Jésus	48	Montmorency No. 2
10	Brome/Shefford	29	Îles-de-la-Madeleine	49	Napierville
11	Chambly	30	Joliette	50	Nicolet
12	Champlain	31	Kamouraska	51	Papineau
13	Charlevoix-Est	32	Labelle	52	Pontiac
14	Charlevoix-Ouest	33	Lac St-Jean Est	53	Portneuf
15	Châteauguay	34	Lac St-Jean-Ouest	54	Québec
16	Chicoutimi	35	Laprairie	55	Richelieu
17	Compton	36	L'Assomption	56	Richmond
18	Deux-Montagnes	37	Lévis	57	Rimouski
19	Dorchester	38	L'Islet	58	Rivière-du-Loup
				59	Rouville
				60	Saguenay
				61	St-Hyacinthe
				62	St-Jean
				63	St-Maurice
				65	Sherbrooke
				66	Soulanges
				67	Stanstead
				68	Témiscamingue
				69	Témiscouata
				70	Terrebonne
				71	Vaudreuil
				72	Verchères
				73	Wolfe
				74	Yamaska

NEWFOUNDLAND
TERRE-NEUVE

01	Avalon
02	Southern Newfoundland
04	Corner Brook/Stephenville
05	Northern Newfoundland
06	Grand Falls/Gander

PRINCE EDWARD ISLAND
ILE-DU-PRINCE-ÉDOUARD

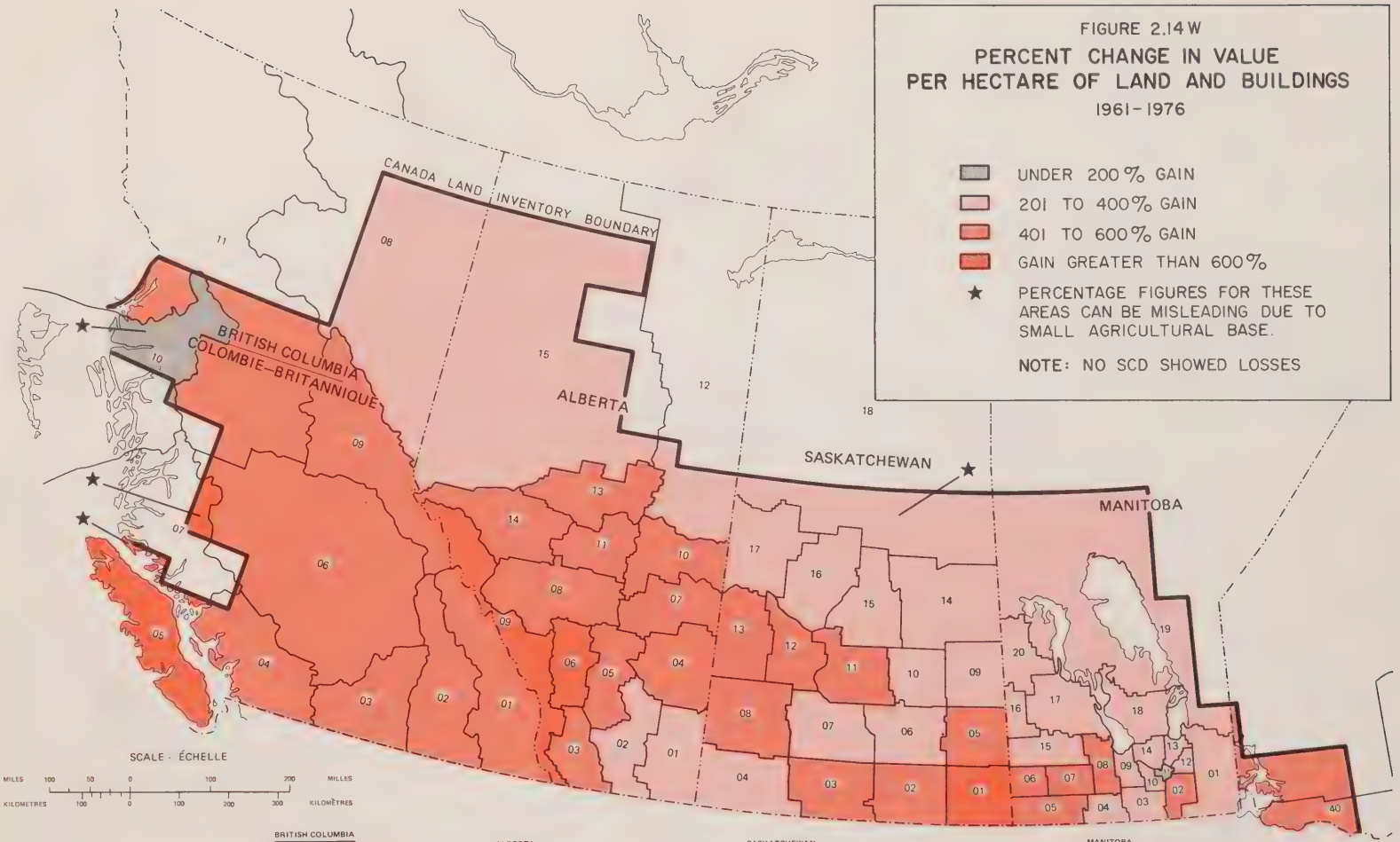
01	Kings
02	Prince
03	Queens

NEW BRUNSWICK
NOUVEAU BRUNSWICK

01	Albert
02	Carleton
03	Charlotte
04	Gloucester
05	Kent
06	Kings
07	Madawaska
08	Northumberland
09	Queens
10	Restigouche
11	St. John
12	Sunbury
13	Victoria
14	Westmorland
15	York

NOVA SCOTIA
NOUVELLE-ÉCOSSE

01	Annapolis
02	Antigonish
03	Cape Breton
04	Colchester
05	Cumberland
06	Digby
07	Guysborough
08	Halifax
09	Hants
10	Inverness
11	Kings
12	Lunenburg
13	Pictou
14	Queens
15	Richmond
16	Shelburne
17	Victoria
18	Yarmouth



BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE

01 East Kootenay
02 Central Kootenay
03 Okanagan
04 Vancouver/Fraser Valley
05 Vancouver Island
06 Cariboo/Thompson
07 Coast
08 Peace River /Liard
09 Fraser/Fort George
10 Skeena/Queen Charlotte
11 Bulkley/Nechako/Stikine

ALBERTA

01 Medicine Hat
02 Taber/Lethbridge
03 Fort McLeod
04 Red Deer Valley
05 Drumheller
06 Calgary
07 Wainwright
08 Davey Thompson
09 Rockies
10 Vermillion
11 Edmonton
12 Athabasca
13 Barrhead
14 Edson
15 Peace

SASKATCHEWAN

01 Moose Mountain
02 Weyburn
03 Assiniboia
04 Cypress Hills
05 Lower Qu'Appelle
06 Regina
07 Moose Jaw
08 Swift Current
09 Canora
10 Quill Lakes
11 Saskatoon
12 Biggar
13 Tramping Lake
14 Pasquia Hills
15 Prince Albert
16 North Battleford
17 Meadow Lake
18 Northern Saskatchewan

MANITOBA

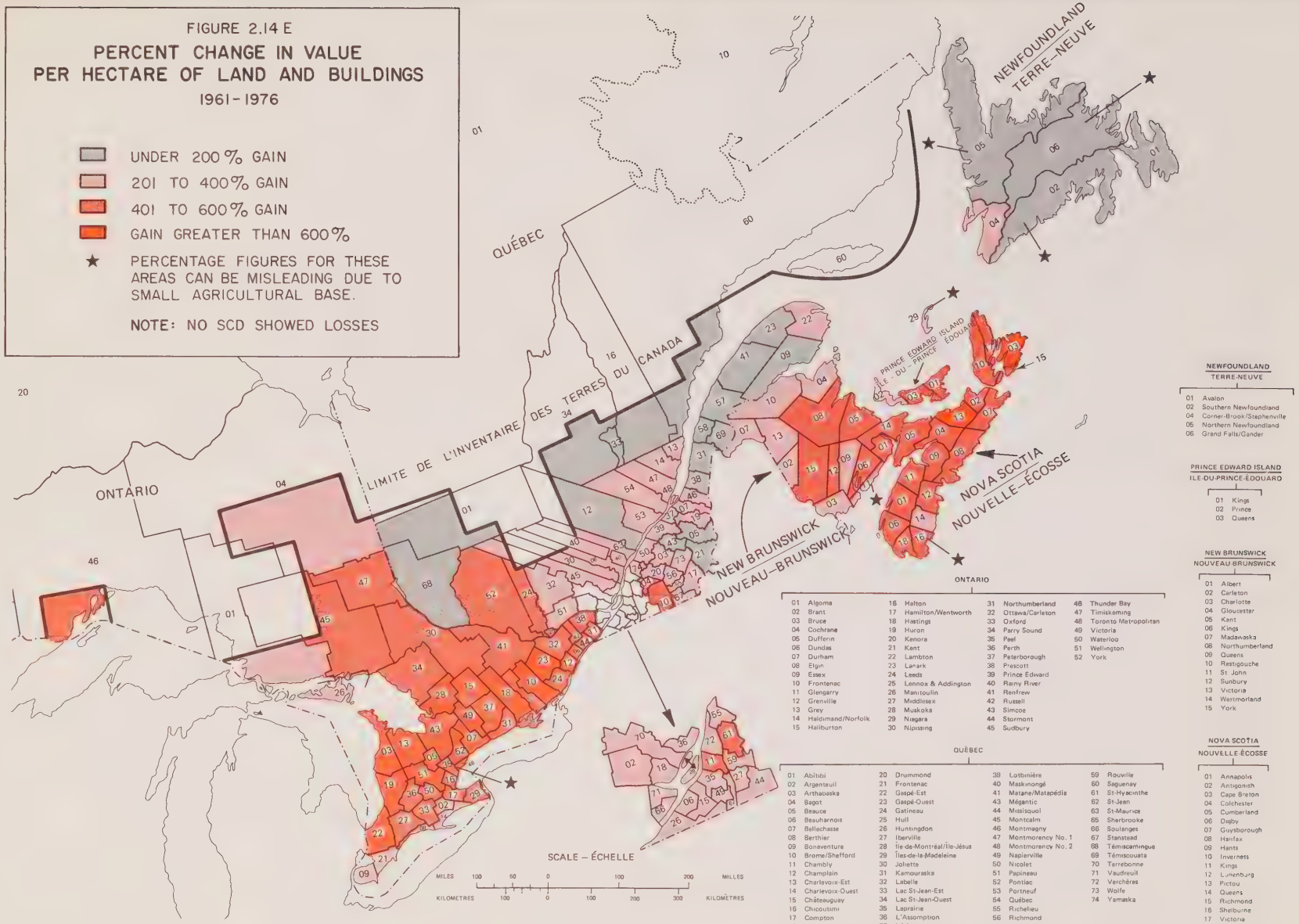
01 Whitemouth
02 Steinbach
03 Red River Valley
04 Pembina
05 Turtle Mountain
06 Virden
07 Brandon
08 Norfolk
09 Portage-la-Prairie
10 St. François Xavier
11 Winnipeg
12 Bird's Hill
13 Selkirk
14 Rosser
15 Minnedosa
16 Shellmouth
17 Dauphin
18 Interlake
19 Northern Manitoba
20 Porcupine Hills

FIGURE 2.14 E

PERCENT CHANGE IN VALUE PER HECTARE OF LAND AND BUILDINGS 1961-1976

- UNDER 200% GAIN
- 201 TO 400% GAIN
- 401 TO 600% GAIN
- GAIN GREATER THAN 600%
- ★ PERCENTAGE FIGURES FOR THESE AREAS CAN BE MISLEADING DUE TO SMALL AGRICULTURAL BASE.

NOTE: NO SCD SHOWED LOSSES



NEWFOUNDLAND / TERRE-NEUVE

01 Avalon
02 Southern Newfoundland
04 Corner-Brook/Stephenville
05 Northern Newfoundland
06 Grand Falls/Gander

PRINCE EDWARD ISLAND / ÎLE-DU-PRINCE-ÉDOUARD

01 Kings
02 Prince
03 Queens

NEW BRUNSWICK / NOUVEAU-BRUNSWICK

01 Albert
02 Carleton
03 Charlotte
04 Gloucester
05 Kent
06 Kings
07 Madawaska
08 Northumberland
09 Queens
10 Restigouche
11 St. John
12 Sunbury
13 Victoria
14 Westmorland
15 York

NOVA SCOTIA / NOUVELLE-ÉCOSSE

01 Annapolis
02 Antigonish
03 Cape Breton
04 Colchester
05 Cumberland
06 Digby
07 Guysborough
08 Halifax
09 Hants
10 Inverness
11 Kings
12 Lunenburg
13 Pictou
14 Queens
15 Richmond
16 Shelburne
17 Victoria
18 Yarmouth

ONTARIO

01 Algoma
02 Brant
03 Bruce
04 Cochrane
05 Dufferin
06 Dundas
07 Durham
08 Elgin
09 Essex
10 Frontenac
11 Glengarry
12 Grenville
13 Grey
14 Haldimand/Norfolk
15 Haliburton
16 Halton
17 Hamilton/Wentworth
18 Hastings
19 Huron
20 Kenora
21 Kent
22 Lambton
23 Lanark
24 Leeds
25 Lennox & Addington
26 Manitoulin
27 Middlesex
28 Muskoka
29 Niagara
30 Nipissing
31 Northumberland
32 Ottawa/Carleton
33 Oxford
34 Parry Sound
35 Peel
36 Perth
37 Peterborough
38 Prescott
39 Prince Edward
40 Rainy River
41 Renfrew
42 Russell
43 Simcoe
44 Stormont
45 Sudbury
46 Thunder Bay
47 Timiskaming
48 Toronto Metropolitan
49 Victoria
50 Waterloo
51 Wellington
52 York

QUÉBEC

01 Abitibi
02 Argenteuil
03 Arthabaska
04 Bagot
05 Beauce
06 Beauharnois
07 Bellechasse
08 Berthier
09 Bonaventure
10 Brome/Shefford
11 Chambly
12 Champlain
13 Charlevoix-Est
14 Charlevoix-Ouest
15 Châteauguay
16 Chicoutimi
17 Compton
18 Deux-Montagnes
19 Dorchester
20 Drummond
21 Frontenac
22 Gaspé-Est
23 Gaspé-Ouest
24 Gatineau
25 Hull
26 Huntingdon
27 Iberville
28 Île-de-Montréal/Île-Jésus
29 Îles-de-la-Madeleine
30 Joliette
31 Kamouraska
32 Labelle
33 Lac St-Jean-Est
34 Lac St-Jean-Ouest
35 Laprairie
36 L'Assomption
37 Lévis
38 Islet
39 Lotbinière
40 Maskinongé
41 Matane/Matapédia
43 Mégantic
44 Missisquoi
45 Montcalm
46 Montmagny
47 Montmorency No. 1
48 Montmorency No. 2
49 Napierville
50 Nicolet
51 Papineau
52 Pontiac
53 Portneuf
54 Québec
55 Richelieu
56 Richmond
57 Rimouski
58 Rivière-du-Loup
59 Rouville
60 Saguenay
61 St-Hyacinthe
62 St-Jean
63 St-Maurice
65 Sherbrooke
66 Soulanges
67 Stanstead
68 Témiscamingue
69 Témiscouata
70 Terrebonne
71 Vaudreuil
72 Verchères
73 Wolfe
74 Yamaska

Land capable of grape production near St. Catharines sells for over $30,000 per hectare.
E.W. Manning

often did. Census farmland in the Toronto SCD was worth an estimated $2,307 per hectare in 1961, an exceptionally high figure even at that time; the average hectare of farmland within that census division was estimated to be worth $2,866 by 1966 and $6,502 by 1971. By 1976, the value of an average hectare of census farmland in the Toronto SCD had reached $15,216, clearly reflecting urban value rather than potential returns to farming. An investment of this sort would certainly have brought returns as good as or even better than a comparable investment in gold during the same period. It is clear that the most expensive farmland in Canada is associated with urban areas, a reflection not just of farmland value, but of the values related to a wide variety of potential non-farm uses.

The highest farmland values (over $5,000 per hectare) in 1976 were reported in eight SCDs: Toronto, Vancouver, Vancouver Island, York, Halton, Peel, Niagara, and Hamilton-Wentworth (see Figure 2.14). The lowest values were reported in parts of Newfoundland and the remote regions of coastal British Columbia; farmland values in the Maritimes were generally in the $400 to $700 range; most areas of the prairies reported 1976 land values in the $200 to $400 per hectare range, while land prices in southern Ontario were generally between $2,000 to $3,000 per hectare, depending on land quality and urban orientation. These figures, being averages over an entire SCD, underestimate the values placed on the best land. Farmland suitable for fruit production in the Niagara region was selling for up to $20,000 per hectare in 1980, and Okanagan Valley irrigated fruitland was selling for $35,000 to $50,000 per hectare in 1980 (private real estate sources). The statistics used to provide the farmland value figures shown in Figure 2.14 also contain the value of major improvements (the value of land and buildings according to the census); these figures therefore give some indication of the intensity of use, the level of capitalization required, and the values placed on land through farm and other demands.

There are two principal factors involved in the escalation of farmland values: expected farm incomes and

anticipated returns for non-farm use. The process of price escalation is complex, since anticipated returns from either source could cause land prices to rise. In turn, higher prices could encourage landowners to intensify the use of their land, either by more intensive farming practices or by conversion of their land to non-farm uses that produce greater returns. Bringing this process full circle, the intensification, or just the possibility of intensification, contributes to increasing land prices. Farmers, then, are faced with the prospect of selling or with the necessity of intensifying their operation (Manning and McCuaig, 1979). The consequences of this process for farmers and their farmland will be explored in greater detail in the following chapter.

Farm consolidation, the growth in average farm size, and rising land values have all contributed to a substantial increase in the value of viable farm units. Rising farm values also affect entry into farming by new farmers because of the amount of capital required. In 1961, the average reported total capital value of census farms ranged from a high of $24,000 in the area immediately surrounding Toronto to less than $2,000 reported in a number of marginal farming areas in Nova Scotia and Newfoundland. By 1976, the average value of a farm unit had risen to more than $120,000 for southern Ontario census districts and to $160,000 in southwestern Alberta. The former represents exceptionally high land values arising from urban proximity, while the latter reflects the huge scale of farming operations necessary in southwestern Alberta. In 1961, most census divisions were reporting average farm values in the range of $3,200 to $5,200 per hectare, and by 1976, most census divisions were reporting average farm values between $20,000 and $40,000. It should be noted that the average farm value reflects not only the value of commercial farms, but is also depressed by the value of marginal enterprises; therefore, the entry costs for a farmer wanting to purchase a successful, productive, and viable operation in nearly all cases will be substantially more than the reported average value.

Summary: What Has Happened to Canada's Agricultural Land

From the data presented in this chapter, it is possible to divide the nation into two sections at the Manitoba-Ontario border. In the west there has been an expansion in the area of farmland, particularly in improved agricultural land. In the east, there has been a reduction in the area of land in farms, though in areas with the highest agricultural capability, there have been some increases in improved agricultural land.

The key nationwide trends evident from the data are:

1) a westward shift of the agricultural land base;
2) a substantial retreat of farmland in the Maritimes and Quebec, and substantial gains in the northern prairies;
3) increasing improvement of land remaining within farm boundaries;
4) a greater degree of correspondence between land in improved agricultural use and land with cropping capability;
5) a substantial increase in the value of land and buildings both per farm and per hectare;
6) a substantial decline in the number of farms and a significant increase in average farm size.

These overall alterations in the use of Canada's agricultural land base raise many questions about possible causes and, more importantly, about the implications and consequences for the nation. The withdrawal from poorer lands may be a testament to their unsuitability, since what is left for development is almost universally poorer than that now in use (Bentley, 1981a; Beattie, *et al.*, 1981). The data used to this point are a good indication of what is happening to agricultural land use at the broad national scale; they do not answer how or why this is occurring, or address the processes at work. To develop a better understanding of what the data mean, a framework incorporating the observed processes has been erected in the following chapter. In assessing the changing use of farmland, it is essential to focus in much greater detail on changes at the regional and farm levels, as well as on the causes of specific land-use changes. Only after the local processes have been understood can consideration be given to the consequences for the users of agricultural land and for the nation.

Vancouver Island hobby farms near Sooke.
E.W. Manning

Chapter Three

THE PROCESS OF CHANGING RURAL LAND USE

The data are conclusive; there have been, even at the national scale, substantial changes in the use of the nation's agricultural land base. The purpose of this chapter is to extract from the data some insights into the processes of change and their relative importance through the following:

Framework
the construction of a theoretical framework to which the analysis of land-use change in subsequent chapters can be related;

Typology
the division of the rural areas of Canada into regions with similar characteristics that permit specific analyses of the processes at work in each.

The Changing Rural Area

During the 15-year study period (1961-1976), there have been significant changes in Canada's rural areas. To the city dweller, the expansion of urban centres and the construction of highways on agricultural land have been the most immediately-visible transformations. These, as will be shown, form only a small part of the rural changes that have occurred, even though rural-to-urban conversion is concentrated on some of the nation's best land for food production (Gierman, 1977).

Two distinct aspects of rural land-use change can be discerned from the SCD data set and other available data sources: the urbanization of agricultural land around urban centres; the substantial losses and gains of farms and farmers reported in predominantly rural regions of Canada.

The data suggest the following hypotheses regarding land-use change in rural Canada:

1) the bulk of agricultural land losses are due to abandonment of farmland or its conversion to such non-urban uses as forestry or outdoor recreation, and most of these losses have occurred in eastern Canada;
2) the most serious agricultural land losses are permanent ones near urban areas where, though small in absolute area, the lands built upon or held for development constitute part of Canada's most productive agricultural lands;
3) the gains in agricultural land have occurred mostly on the northern margins of the prairies which have substantially less versatility in crop production than farmlands in the southern prairies or in Ontario;
4) part of the overall intensification of farming has been the improvement of lands remaining in farming, as well as the abandonment of lands not amenable to improved practices.

From the Fringe to the Margins: Building a Conceptual Framework

In order to understand what is happening in rural Canada, the agricultural ecumene has first been classified into its constituent parts through the formation of a conceptual model. Because of the pervasive impact of urban areas, the model is based on distance from the boundaries of urban centres.* It should be understood that only relative, and not absolute, distances are used in the framework of this model, since the distance effect of urban areas differs substantially according to the size and nature of the urban centre, the characteristics of the physical resource, and the nature of agricultural activity. Each component will be discussed independently before the model is assembled; later, the static and dynamic aspects of the model will be presented and used to classify the constituent parts of the agricultural ecumene.

The demands for agricultural land can be divided into two primary types: urban-related demands and non-urban related. The primary non-urban demand for land with agricultural capability is, of course, farming.

Urban demands placed on land, following the Von Thünen (1966) approach, decline sharply with distance from urban centres (Sinclair, 1967). Figure 3.1 illustrates how urban demands decline in relation to dis-

* For the purposes of these models the boundaries of urban centres can be considered as the outer limits of contiguous built-up urban area.

◀ Close-up of wheat in a Saskatchewan field.
Bryce Flynn, NFB Phototheque

Rural recreation is popular in the Gatineau Hills, near Low, Quebec.
E.W. Manning

Fig 3.1

tance decay of returns (economic rent) to urban-related uses (Line A), such as residential, commercial, industrial, transportation, and recreational services for urbanites (e.g., golf courses, race tracks, etc.). The closer to the city, the greater are potential returns from the use of the land. With distance, these returns decline, eventually approaching zero. Over time, the position of the line can shift due to changing demands; Line B demonstrates the result of a general increase in urban-related demands for land. In theory, urban demands can also decrease, though recently this has rarely been the case.

The agricultural sector also places demands on land. Figure 3.2 shows the returns to farming, also relative to urban centres, so a comparison of the two types of demands can then be made. Economic returns to farming vary considerably less in relation to distance from urban centres than do returns to urban use. Factors such as land quality and farm management will affect returns for specific properties, but, in general, the distance from Canadian urban centres corresponds to the returns to farming (see also Okafor, 1975). This relationship is due, at least in part, to the fact that most of the major urban centres in Canada are built on the nation's best farmland (Manning and McCuaig, 1977). Good access to market is also a factor. When applied to specific urban centres, then, the distance represented by the horizontal axis may vary considerably.

Most of Line A in Figure 3.2 is relatively level, indicating the general returns to farming in much of the agricultural ecumene. Line A rises near urban centres, reflecting good land capability and the intensity of farming operations. Immediately adjacent to urban centres, however, agricultural viability declines, primarily because of high land costs, anticipated conversion to urban uses, and nuisance factors (e.g., vandalism, trespassing, etc.). Returns to use drop off on the periphery of the agricultural ecumene because of declining land quality, transport costs, and, in Canada, climatic limitations.

As in the urban part of the model (Figure 3.1), the line denoting returns to agricultural uses can shift up or down, represented in Figure 3.2 by Lines B and C. Declining or increasing returns to farming are commonly due to variations in inputs, technology, or management practices as well as to increases in such input costs as energy, labour, and fertilizers.

The final element of the model is a line representing the expectations of individuals regarding a minimum acceptable living standard. This concept incorporates not only economic factors (income), but also social factors such as lifestyle, access to amenities, and quality-of-life considerations. Figure 3.3, using the same base as the previous figures, illustrates this line of individual expectations.

The expectations line may be seen as nearly level, reflecting the current convergence of urban and rural perceptions. With the possible exception of a few of the most remote areas, the expectations of rural Canadians approach urban norms. Most Canadians, urban or rural, farm or non-farm, now expect an automobile, a television set, central heating, indoor plumbing, and an annual vacation in return for their labours. The distinction between the rural and the urban dweller has, with few exceptions, disappeared (Ricour-Singh, 1981). However, at the furthest distance from urban centres, expectations could more accurately be referred to as meeting the basic human requirements (food, shelter, etc.), hence the dip in Line A. The level of expectation of Canadians has increased over time, moving the line

FIGURE 3.1

RETURNS TO URBAN USES

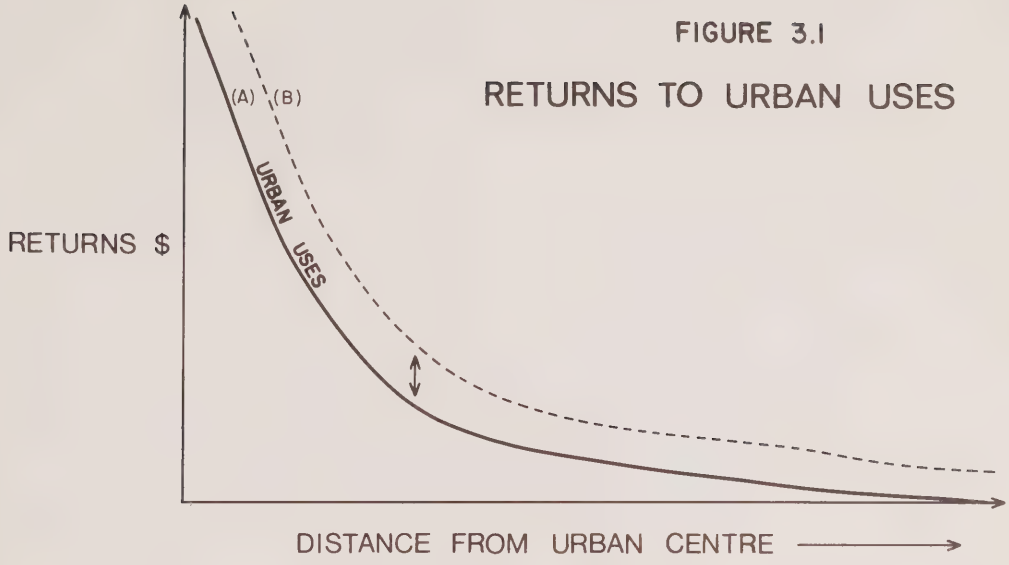


FIGURE 3.2

RETURNS TO FARMING

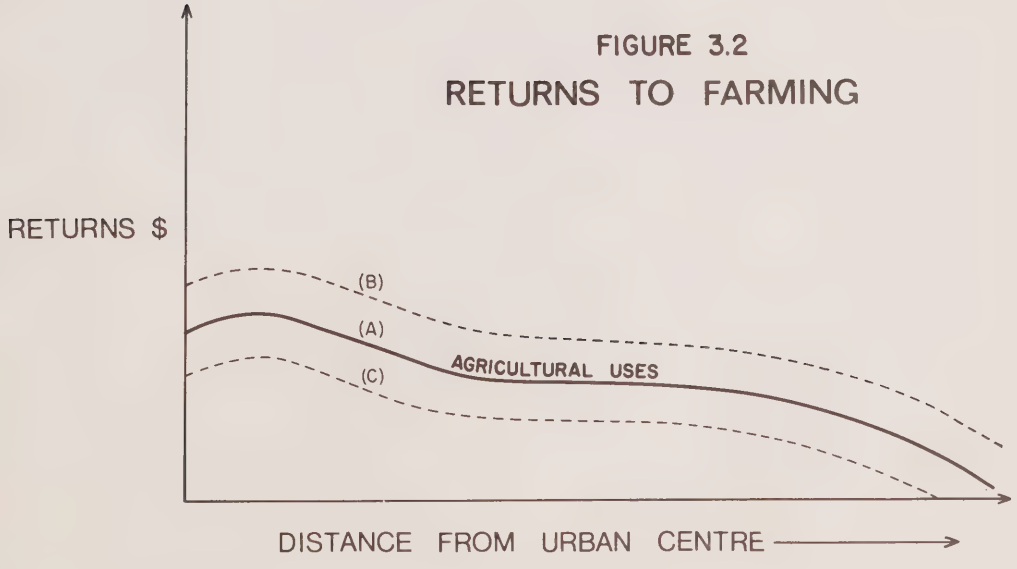


FIGURE 3.3

EXPECTATIONS

(Acceptable Living Standard)

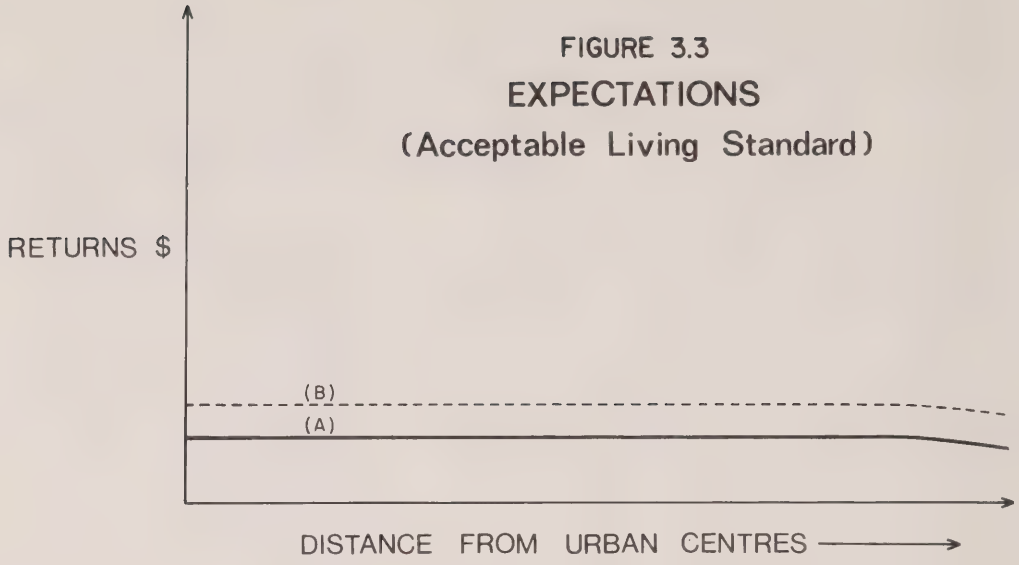
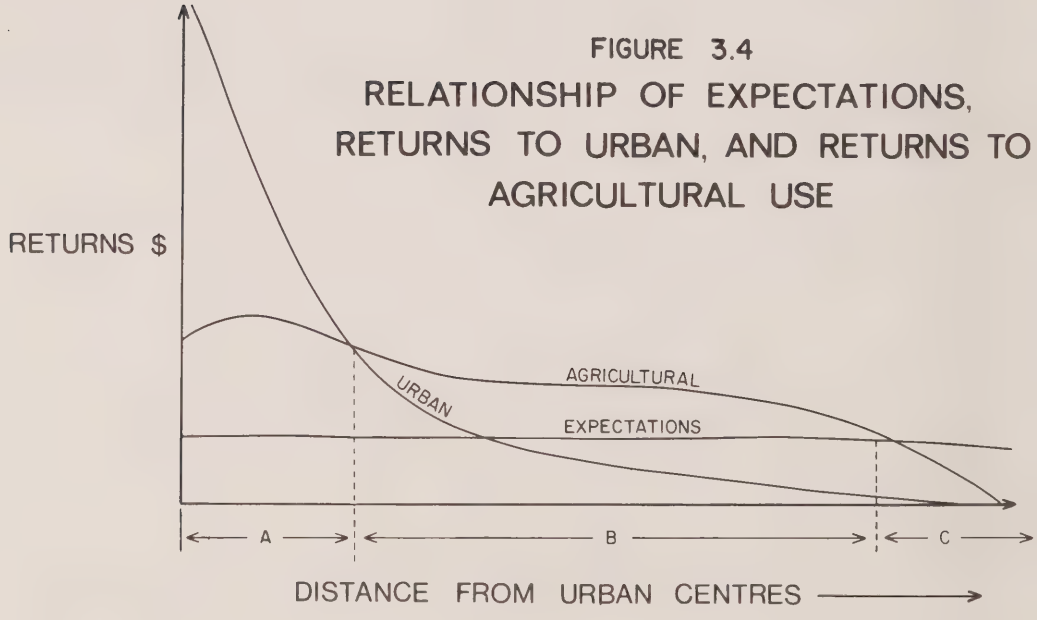


FIGURE 3.4

RELATIONSHIP OF EXPECTATIONS, RETURNS TO URBAN, AND RETURNS TO AGRICULTURAL USE



upwards (Figure 3.3, Line B). The line could also fall with a decline in expectations, though this has not happened in recent decades.

Putting the three lines together, Figure 3.4 shows, following the Von Thünen approach, three zones relative to urban centres:

1) Zone A where urban-related returns exceed others;
2) Zone B where agricultural returns exceed others and are greater than the line of expected living standards;
3) Zone C where expectations or basic requirements exceed agricultural returns.

These zones can be designated as the urban fringe (A), the agricultural zone (B), and the area where agriculture is not viable (C); other uses are not shown. Figure 3.5 will introduce the dynamics of changes in urban and agricultural returns, further subdividing agricultural land relative to urban influence.

The zone closest to the urban boundary is the urban fringe, defined here as that area of rural land in which the urban land market predominates. The urban fringe is the region where the returns deriving from the use of land for urban-related purposes generally exceed the returns for using that land in the type of agriculture to which it is most suited. Typically this region is peri-urban (seldom more than 10 kilometers from the contiguous built-up area), is often included within the administrative boundaries of urban areas, and may already be serviced by trunk-water and sewer lines in anticipation of urban growth (Neimanis and McKechnie, 1981).

The second major zone, the agricultural heartland, represents those regions of Canada where agriculture is generally viewed as a viable land use and is the predominating enterprise. In terms similar to those used above to describe the fringe, the heartland is that region where the value deriving from the use of land for agriculture generally exceeds the value of returns for using that land for purposes other than agriculture. Alterations in the markets for individual crops, however, can cause land-use changes, temporary land abandonment, or farm enlargement. The agricultural heartland of Canada is subject to urban-oriented pressures, but to a lesser degree than the urban fringe. These pressures are related primarily to the use of the countryside for recreation and to the infusion of urban values into the rural community.

The urban shadow is the competition zone between urban and rural uses; it is that part of the heartland where either urban-related uses or agriculture may be found, but where agriculture occupies most of the land area. The urban shadow is shown in Figure 3.5 as the shaded area. Depending on relative demands, however, either agricultural or urban uses may outbid the other for land. This zone will not see any significant continuous conversion, only sporadic conversion, with no prospect of full conversion to urban use.

Non-farm demands in the shadow usually take the form of recreation, rural residence, hobby farms, pits and quarries, transportation services, garbage dumps, etc. These uses do not dominate the land market; rather, they affect prices and uses of specific types of properties (usually smaller than is thought viable for farming), with a decided preference for areas less than an hour's drive away from urban centres due to accessibility and transport costs (Friedman and Miller, 1965). Bryant (1981) notes that in an urbanizing environment, a key factor influencing which lands are converted to urban use are the individual landowners' evaluations of the strength of the urbanizing forces. As urban-related demands increase and urban centres grow, the shadow occupies more and more of the heartland (Gertler, 1961; Martin, 1975) though the basic characteristics of the urban shadow remain agricultural.

The farthest limit of agriculture is defined at any time as the agricultural margin. This is where the ability to earn an income from farming is equal to the minimum acceptable standard, which includes economic as well as quality-of-life factors (Beattie, *et al.*, 1981). The margin is illustrated in Figure 3.6 as point X.

The physical location of the margin can move as a result of changes in agricultural income and in overall expectations. Two conditions can cause a retreat of the margins: rising expectations or falling profits. The retreat of the margins from point X to point Y in Figure 3.6 is caused by the inability of a farming income to meet rising expectations. Declines in farm income with stable expectations could also produce the same result. The advance of the margin, away from urban centres to point Z, is produced by a greater increase in farm income than in expectations. This same advance could be produced by an unlikely decline in expectations. However, these changes in the location of the margin point in Figure 3.6 occur gradually.

FIGURE 3.5 DYNAMICS OF THE INNER BOUNDARY

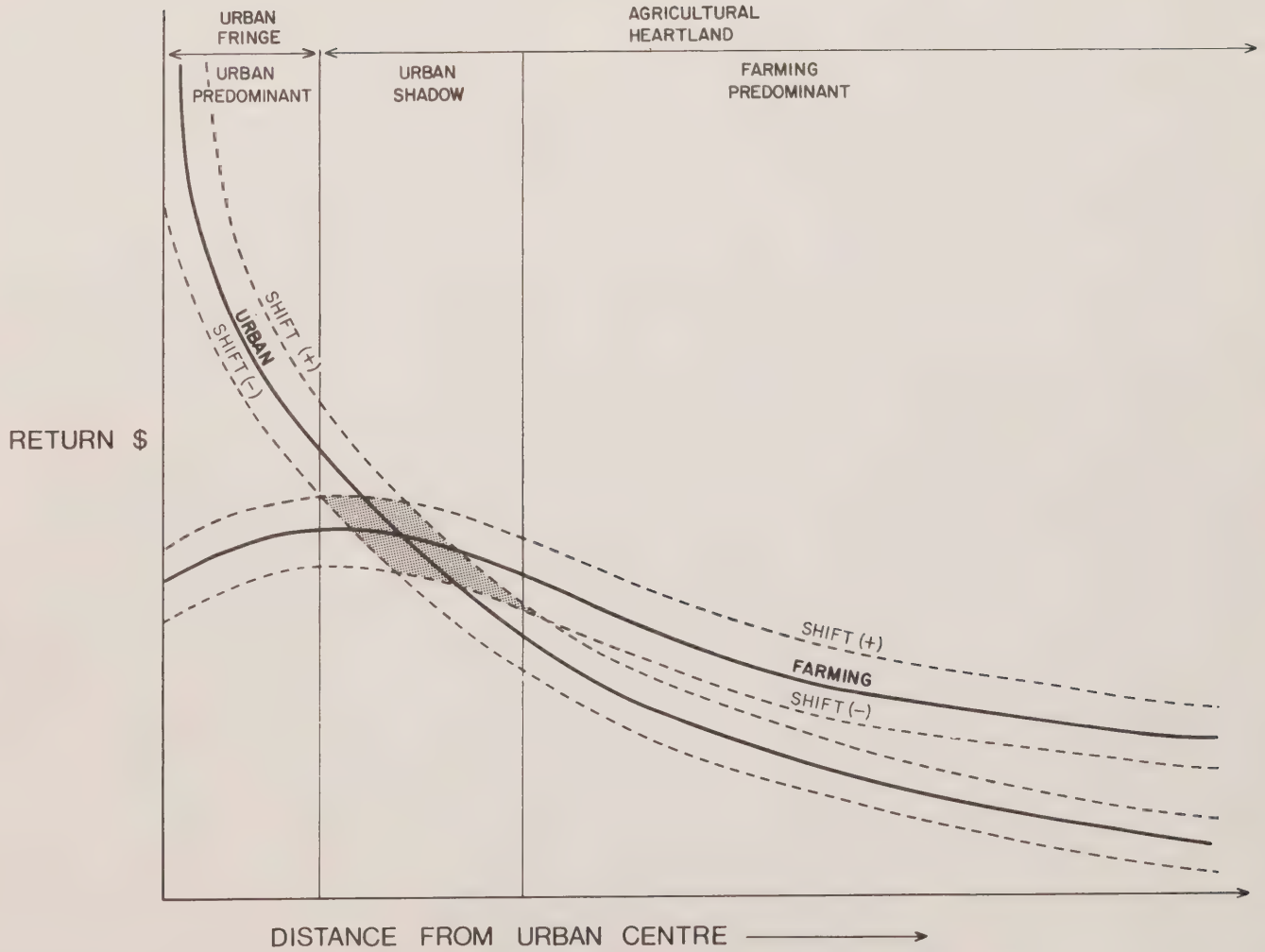
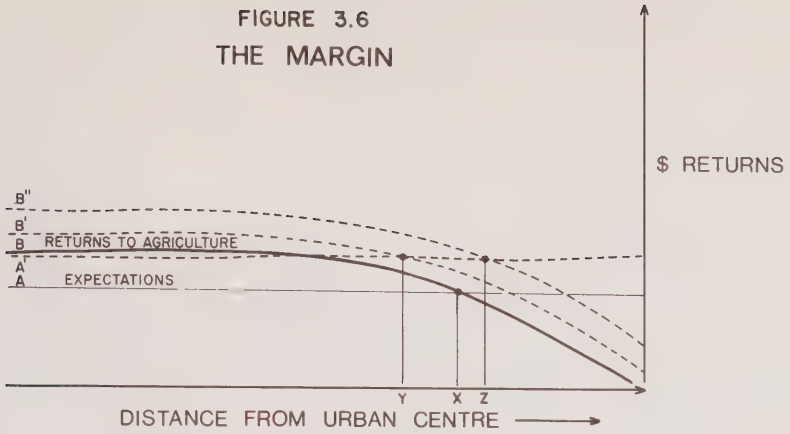


FIGURE 3.6
THE MARGIN



The retreating margins (e.g., from point X to Y in Figure 3.6) can be defined as areas where the margin has withdrawn, leaving less land in agriculture. Because the response of individuals to the retreat of the economic margin is gradual, many sub-marginal farms may remain in such regions. Typically, however, such regions are characterized by rapid losses in numbers of farms, area in agriculture, and area of improved agricultural land.

When the margin advances (e.g., from point X to Z in Figure 3.6) agriculture expands into new areas. The advancing frontier can be defined as areas where the economic margin has advanced, allowing more land to be put into viable agriculture. Such areas usually have significant increases in the area in agriculture and in the area of improved agricultural land. The advance may displace such alternate uses as forestry or wildlands. Conversely, the retreat of the agricultural margins may result in the replacement of agriculture by such alternatives.

The Framework Applied to Canada

The agricultural time series data from Chapter Two permit the use of systematic data to indicate locations with the characteristics of the agricultural heartland, the advancing frontier, and the retreating margins for the period from 1961 to 1976. Due to the scale of the data set, the urban fringe is difficult to distinguish except for those data units closely circumscribing major urban areas (e.g., Toronto or Winnipeg). Figure 3.7 is a map of the agricultural heartland, urban fringe, advancing frontier, and retreating margins, based on the following criteria:

1) *Advancing frontiers*—an increase from 1961 to 1976 of over 25% * in total area of farmland and an increase of over 20% in improved land.

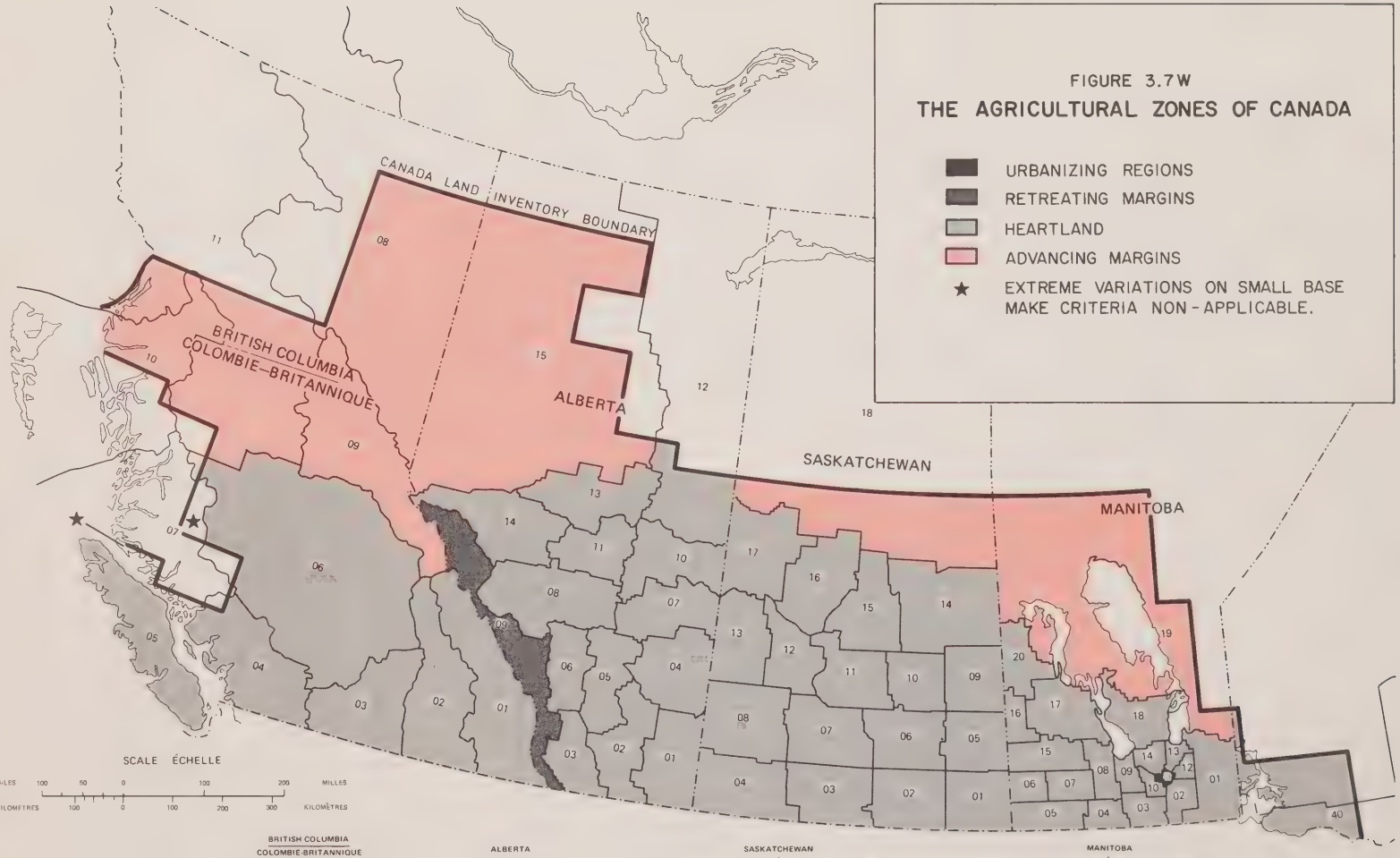
2) *Retreating margins*—these areas had losses of over 25% in farmland and over 15% in improved land from 1961 to 1976 (all retreating margins also lost more than 25% of farms).

3) *Urban fringe*—for the purposes of this data set urban-fringe areas have been arbitrarily separated from retreating margins by the criterion of 1976 farmland per hectare value of $1,200 or more. The urban fringe shows similar characteristics to the retreating margins for data units closely circumscribing major urban centres.

4) *Heartland*—this is an area of relative stability in farmland and improved land, showing neither the levels of gains required to qualify as advancing frontier, nor the losses required to qualify as retreating margins or urban fringe. There are eastern and western subdivisions of the heartland, based on the differing nature of farming in each region.

The characteristics and problems of each of the identified agricultural zones will be examined in the context of the framework constructed above (Figures 3.1 to 3.6). Table 3.1 provides the background data for each of the zones (separating eastern and western heartland), showing their characteristics in terms of the different indicators of agricultural change used in Chapter Two.

* These break points have been determined on the basis of the observed distribution of the data and reflect the observed break points where differences between classes are maximized. These classes correspond well to differences observed in other variables (see Table 3.1).



BRITISH COLUMBIA / COLOMBIE-BRITANNIQUE

01	East Kootenay
02	Central Kootenay
03	Okanagan
04	Vancouver/Fraser Valley
05	Vancouver Island
06	Cariboo/Thompson
07	Coast
08	Peace River / Liard
09	Fraser/Fort George
10	Skeena/Queen Charlotte
11	Bulkley/Nechako/Stikine

ALBERTA

01	Medicine Hat
02	Taber/Lethbridge
03	Fort McLeod
04	Red Deer Valley
05	Drumheller
06	Calgary
07	Wainwright
08	Dewey Thompson
09	Rockies
10	Vermillion
11	Edmonton
12	Athabasca
13	Barrhead
14	Edson
15	Peace

SASKATCHEWAN

01	Moose Mountain
02	Weyburn
03	Assiniboia
04	Cypress Hills
05	Lower Qu'Appelle
06	Regina
07	Moose Jaw
08	Swift Current
09	Canora
10	Quill Lakes
11	Saskatoon
12	Biggar
13	Tramping Lake
14	Pasquia Hills
15	Prince Albert
16	North Battleford
17	Meadow Lake
18	Northern Saskatchewan

MANITOBA

01	Whitemouth
02	Steinbach
03	Red River Valley
04	Pembina
05	Turtle Mountain
06	Virden
07	Brandon
08	Norfolk
09	Portage la-Prairie
10	St. François Xavier
11	Winnipeg
12	Bird's Hill
13	Selkirk
14	Rosser
15	Minnedosa
16	Shellmouth
17	Dauphin
18	Interlake
19	Northern Manitoba
20	Porcupine Hills

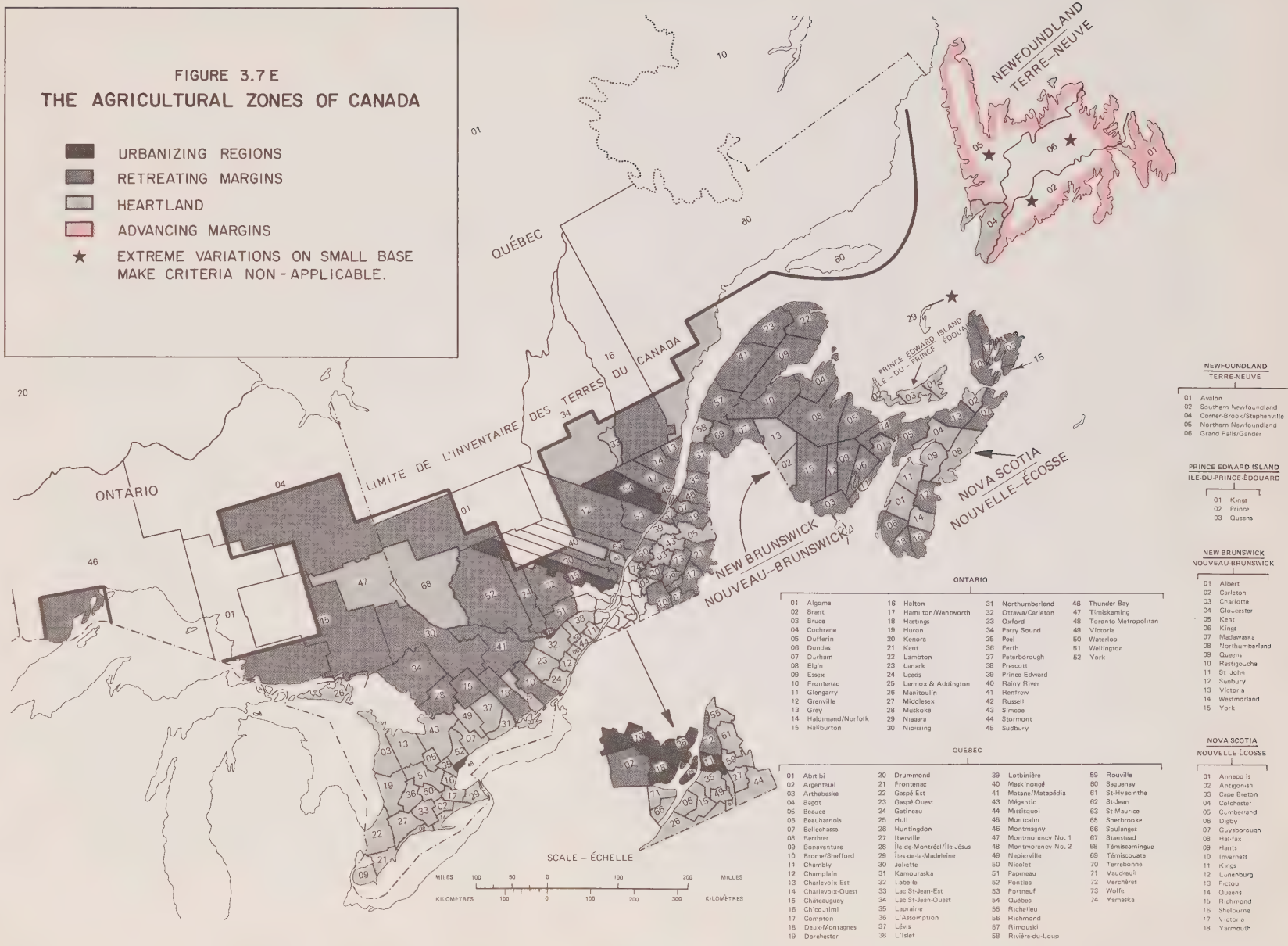


FIGURE 3.7 E
THE AGRICULTURAL ZONES OF CANADA
URBANIZING REGIONS
RETREATING MARGINS
HEARTLAND
ADVANCING MARGINS
★ EXTREME VARIATIONS ON SMALL BASE MAKE CRITERIA NON-APPLICABLE.
NEWFOUNDLAND
TERRE-NEUVE
QUÉBEC
LIMITE DE L'INVENTAIRE DES TERRES DU CANADA
ONTARIO
PRINCE EDWARD ISLAND
ÎLE-DU-PRINCE-ÉDOUARD
NOVA SCOTIA
NOUVELLE-ÉCOSSE
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
SCALE – ÉCHELLE
MILES
KILOMETRES
NEWFOUNDLAND
TERRE-NEUVE
01 Avalon
02 Southern Newfoundland
04 Corner Brook/Stephenville
05 Northern Newfoundland
06 Grand Falls/Gander
PRINCE EDWARD ISLAND
ÎLE-DU-PRINCE-ÉDOUARD
01 Kings
02 Prince
03 Queens
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
01 Albert
02 Carleton
03 Charlotte
04 Gloucester
05 Kent
06 Kings
07 Madawaska
08 Northumberland
09 Queens
10 Restigouche
11 St John
12 Sunbury
13 Victoria
14 Westmorland
15 York
NOVA SCOTIA
NOUVELLE-ÉCOSSE
01 Annapo lis
02 Antigonish
03 Cape Breton
04 Colchester
05 Cumberland
06 Digby
07 Guysborough
08 Hal-fax
09 Hants
10 Inverness
11 Kings
12 Lunenburg
13 Pictou
14 Queens
15 Richmond
16 Shelburne
17 Victoria
18 Yarmouth
ONTARIO
01 Algoma
02 Brant
03 Bruce
04 Cochrane
05 Dufferin
06 Dundas
07 Durham
08 Elgin
09 Essex
10 Frontenac
11 Glengarry
12 Grenville
13 Grey
14 Haldimand/Norfolk
15 Halliburton
16 Halton
17 Hamilton/Wentworth
18 Hastings
19 Huron
20 Kenora
21 Kent
22 Lambton
23 Lanark
24 Leeds
25 Lennox & Addington
26 Manitoulin
27 Middlesex
28 Muskoka
29 Niagara
30 Nipissing
31 Northumberland
32 Ottawa/Carleton
33 Oxford
34 Parry Sound
35 Peel
36 Perth
37 Peterborough
38 Prescott
39 Prince Edward
40 Rainy River
41 Renfrew
42 Russell
43 Simcoe
44 Stormont
45 Sudbury
46 Thunder Bay
47 Timiskaming
48 Toronto Metropolitan
49 Victoria
50 Waterloo
51 Wellington
52 York
QUEBEC
01 Abitibi
02 Argenteuil
03 Arthabaska
04 Bagot
05 Beauce
06 Beauharnois
07 Bellechasse
08 Berthier
09 Bonaventure
10 Brome/Shefford
11 Chambly
12 Champlain
13 Charlevoix Est
14 Charlevoix-Ouest
15 Châteauguay
16 Chicoutimi
17 Compton
18 Deux-Montagnes
19 Dorchester
20 Drummond
21 Frontenac
22 Gaspé Est
23 Gaspé Ouest
24 Gatineau
25 Hull
26 Huntingdon
27 Iberville
28 Île de Montréal/Île-Jésus
29 Îles-de-la-Madeleine
30 Joliette
31 Kamouraska
32 Labelle
33 Lac St-Jean-Est
34 Lac St-Jean-Ouest
35 Laprairie
36 L'Assomption
37 Lévis
38 L'Islet
39 Lotbinière
40 Maskinongé
41 Matane/Matapédia
42 Mégantic
43 Missisquoi
44 Montcalm
45 Montmagny
46 Montmorency No. 1
47 Montmorency No. 2
48 Napierville
49 Nicolet
50 Papineau
51 Pontiac
52 Portneuf
53 Québec
54 Richelieu
55 Richmond
56 Rimouski
57 Rivière-du-Loup
58 Rouville
59 Saguenay
60 St-Hyacinthe
61 St-Jean
62 St-Maurice
63 Sherbrooke
64 Soulanges
65 Stanstead
66 Témiscamingue
67 Témiscouata
68 Terrebonne
69 Vaudreuil
70 Verchères
71 Wolfe
72 Yamaska

Table 3.1

Comparative Statistics for Canada's Agricultural Zones

	Advancing Frontier	Western Heartland	Eastern Heartland	Retreating Margins	Urban Fringe	Canada
Farms						
Number of farms 1961	13,214	218,667	156,526	85,078	7,392	480,877
Number of farms 1976	13,197	171,556	108,819	40,944	4,036	338,552
Change 1961-76	-17	-47,111	-47,707	-44,134	-3,356	-142,325
Percent change 1961-76	-0.1	-21.5	-30.5	-51.9	-45.4	-29.5
Farmland						
Area 1961 ('000 ha)	2,347	51,977	9,125	6,067	311	69,827
Area 1976 ('000 ha)	3,752	53,139	7,610	3,746	180	68,427
Change 1961-76 ('000 ha)	+1,405	+1,162	-1,515	-2,321	-131	-1,400
Percent change 1961-76	+59.8	+2.2	-16.6	-38.2	-42.1	-2.0
Improved Land						
Area 1961 ('000 ha)	1,247	31,805	6,028	2,546	221	41,847
Area 1976 ('000 ha)	2,068	34,734	5,481	1,805	139	44,227
Change 1961-76 ('000 ha)	+821	+2,929	-547	-741	-82	+2,380
Percent change 1961-76	+65.8	+9.1	-9.1	-29.1	-37.1	+5.6
Average Farm Size (ha/farm)						
Size 1961	177	237	58	71	42	145
Size 1976	284	309	70	91	45	201
Change 1961-76	+107	+72	+12	+20	+3	+56
Percent change 1961-76	+60.4	+30.4	+20.7	+28.2	+7.1	+38.6
Value per Farm						
Value 1961 ('000$)	13.18	21.07	18.72	8.94	20.39	17.93
Value 1976 ('000$)	94.84	145.46	136.49	52.86	82.29	128.65
Change 1961-76 ('000$)	+81.66	+124.39	+117.77	+43.92	+61.89	+110.72
Percent change 1961-76	+620	+590	+629	+491	+304	+617
Value per Hectare						
Average value 1961 ($)(ha)	74.17	88.63	321.13	125.39	483.84	123.48
Average value 1976 ($)(ha)	333.59	470.41	1,955.13	577.69	1,839.15	637.62
Change 1961-76	+259.42	+381.78	+1,633.45	+452.30	+1,355.31	+514.14
Percent change 1961-76	+350	+429	+507	+361	+280	+416
Ratios*						
Improved Land 1961/CLI 1-3	.381	1.069	.830	.573	.694	.928
Improved Land 1976/CLI 1-3	.632	1.168	.754	.406	.439	.981
Change 1961-76	+.251	+.099	-.076	-.167	-.256	+.053
Improved Land 1961/Farmland	.531	.612	.661	.420	.709	.599
Improved Land 1976/Farmland	.551	.654	.720	.482	.773	.646
Change 1961-76	+.02	+.042	+.059	+.062	+.064	+.047
Farmland/(CLI 1-5) 1961**	.130	.928	.853	.437	.660	.705
Farmland/(CLI 1-5) 1976**	.208	.949	.712	.270	.383	.691
Change 1961-76	+.078	+0.21	-.141	-.167	-.277	-.014

* Does not include Yukon and Northwest Territories.

** Class 6 is marginal for agricultural use and has been eliminated for the purposes of this ratio.

SOURCE: National Data Base.

This part of Ontario once provided an acceptable standard-of-living.
E.W. Manning

The Loss of Farmland to Urbanization

The urban fringe contains a complex mixture of land uses, with intensive agriculture, idle land, waste disposal sites, and urban-related uses all found in close proximity to one another. The urban fringe is the area beyond contiguous urban boundaries where the value from urban land use exceeds that of agricultural production. This limits the definition of the urban fringe to that area susceptible to contiguous subdivision or to creation of housing developments for those employed in urban areas (Figure 3.5). Because the transition from rural to urban is an ongoing process, the fringe cannot be seen as a single line, but as a zone. The principal concern within this zone is the permanent alienation of agricultural land. Gierman and Lenning (1980) have indicated that for the period from 1966 to 1971 Canada's major urban areas expanded by 87,100 hectares, more than three-quarters of which was previously under agricultural use (see Table 2.1). From 1971 to 1976, the process continued, with a further 62,300 hectares being converted to urban use (Warren and Rump, 1981).

Although the total area converted from rural to urban land use may seem small compared to the total agricultural area of Canada (123 million hectares of CLI classes 1-6), the significance of these figures is that most of the expansion of urban areas has been on Canada's most productive agricultural land. Recent publications, by Manning and McCuaig (1977), Neimanis (1979), and Simpson-Lewis, *et al.* (1979), have demonstrated that prime agricultural land in Canada generally lies within the urban shadow of major metropolitan areas. In 1971, 46.8% of the value of Canadian agricultural production came from land within 80 kilometers (50 miles) of the centre of the 22 Census Metropolitan Areas. Conversion of some high quality agricultural land is virtually unavoidable, particularly for centres like London or Regina that are completely surrounded by prime agricultural land (see maps in Simpson-Lewis, *et al.*, 1979, 201-202). For many other urban centres, however, options do exist for diverting growth to poorer quality, but equally serviceable, lands (Neimanis, 1979; Neimanis and McKechnie, 1981).

The Urban Conversion of Farmland: The Case of Toronto

From 1966 to 1976, the Toronto urban area grew by 17,787 hectares (Warren and Rump, 1981). Of this total, 96% was high capability agricultural land and 82% was in improved agriculture in 1966. A total area of 1,073 hectares of orchards (1966) were urbanized from 1966 to 1976. During this period in the Toronto Census Metropolitan Area (CMA), the number of commercial farms fell from 4,391 to 3,112, a loss of 29%. The total area of land lost from census farms was 113,049 hectares, or over half the land in farms in 1966. Some of this land went directly to urban use, while other land could still be idle in anticipation of future subdivision or sale.

While some planning controls have been adopted at the regional and county levels, the impact on land conversion has not been great. Even though Toronto has one of the best records for per capita conversion, using only 32 hectares of land for every 1,000 population growth from 1966 to 1976, the percentage of converted high quality land diminished only slightly over the 1966-1971 and 1971-1976 periods. Toronto is surrounded by some of Canada's highest capability agricultural land, and its growth almost inevitably must be at the expense of class 1, 2, or 3 agricultural land. To find significant areas of lower capability land, one must look over 20 kilometers away (Neimanis, 1979). The planning process cannot always encourage use of distant alternatives when easily serviced land lies nearby. Because of urban growth, Toronto and adjacent Peel County report the highest rural land values in the nation; agricultural use is thus further discouraged. Located on the nation's best agricultural land and growing, Toronto is representative of most Canadian cities.

Gierman (1977) and Warren and Rump (1981) have shown that Canadian urban centres have failed to divert growth from the highest quality resource lands. From 1966 to 1971, over 75% of the land built upon was high capability agricultural land. It is worth noting here that within 16 kilometers (10 miles) from the centres of Canadian metropolitan areas, 47.3% of the land was high capability or CLI classes 1-3 (Neimanis, 1979). The 1971 to 1976 conversion figures show that the percentage has remained the same (75%), though the overall area built on has slightly diminished due to lower population growth rates. There has been little evidence of success in efforts to direct urban growth onto poorer quality land, even where viable options do exist.

Reports from many cities show the gradual absorption of market gardening areas, milksheds, and fruit farms within urban boundaries. Many Canadians can cite from personal experience instances of recently-farmed areas that are now collections of houses, industrial sites, or highway rights-of-way. In the 1975 Ontario election, a controversy developed over the loss of an average of 10 hectares (26 acres) an hour from the agricultural base of the province. It was suggested that the expansion of urban and industrial areas was resulting in the paving over of much of Ontario's agricultural land base. The census supports the 10 hectares per hour figure, but the principal culprit is not urban development.

Subdividing orchard land in Vineland, Ontario.
E.W. Manning

Data from Gierman (1977) showed that only .8 hectares per hour of the publicized loss of 10 hectares per hour was due to urban development.* With updated figures for the 1971 to 1976 period (Warren and Rump, 1981), the overall loss was actually 4.5 hectares hourly of which 0.5 hectares were lost to urban development. In Ontario, 79% of the land built on from 1966 to 1971 was farmed in 1966 and 77% of the land built on from 1971 to 1976 was farmed in 1971. In comparison, the Canadian totals for urbanization of rural land proved to be 2.0 hectares per hour from 1966 to 1971 and 1.4 hectares per hour from 1971 to 1976, over 60% of which was converted from farmland in both periods. While this total area was small, most of it constituted part of Canada's prime foodland resource: the irreplacable fruit and specialty crop-producing lands of the Niagara, the St. Lawrence Valley, and the B.C. lower mainland.

* These data cover urban development for all centres over 25,000 population.

Numerous studies have analysed the problems of agriculture in the urban fringe (e.g., Bryant, 1976; Rodd, 1976; Troughton, 1978). It has been widely acknowledged that farmers within the urban fringe must deal with more pressures than farmers within the heartland and the margins (see Thompson, 1980). The following are among the pressures placed on urban-fringe farmers:

1) considerably higher land prices and, therefore, higher opportunity costs on their capital investment;
2) more direct opportunities to make one-time profits from the sale of all or part of their land for non-agricultural pursuits;
3) increased management requirements due to such nuisance factors as vandalism, pilferage, trespass, and neighbourhood incompatibilities;
4) a greater degree of local regulation on the activities they may undertake—for example, limits on use of equipment on the local roads, placement of waste and manure, spraying, etc.;

5) increased demands for new services (often not required or desired by the farm population) to be funded by all residents and consequently increased taxes which, because of their larger land holdings, often fall more heavily on farmers;
6) transformation of basic infrastructure with emphasis on urban rather than rural requirements.

All of these factors together create a substantial impetus for the farmer to alter activities to serve an urban market, to sell out to someone who will, or to sell directly to urban uses. As indicated in the agricultural model (Figure 3.2), an alternative to urban opportunities is intensification of agricultural activity. This may, in fact, be an intermediate stage before final urbanization. Consequently, some of the most productive and highly-capitalized farms are found on the urban fringe, and it is these farms that are often displaced by expansion of urban areas. In contrast, an urban-fringe farm could also be in a state of decline, since owners could be reluctant to make major investments because of imminent conversion to urban use. Similarly, land could be held idle both by farmers and other speculators in anticipation of urbanization.

The fringe is therefore an area both in transition and in anticipation of transition (Spurr, 1976; Bryant, 1981). The fringe is also an area where economic, social, and often governmental pressures conspire to ensure that all of the land resource is eventually converted to non-agricultural use. The figures generated from census data indicate that several census districts on the periphery of major urban areas are among those regions in Canada where disappearance of agricultural land has occurred at the greatest rate (Figure 2.2). Agriculture has all but disappeared in such SCDs as Winnipeg, Ile de Montréal and Toronto. Other urban-fringe districts show a decline in farming to a point where the thresholds necessary to maintain rural-oriented infrastructure are threatened. While small in area relative to the nation's agricultural base, these losses are significant because of the quality of the land resource and the productivity of the agricultural enterprises that have disappeared.

A feedlot adjacent to a new subdivision in Vernon, B.C.
E.W. Manning

The Agricultural Heartland

The heartland is where agriculture is the predominant land use as well as the foremost economic activity. The traditional view of the agricultural heartland has been one of stability, characterized by a pastoral image of a productive rural landscape tended by the farmer and his family. While relative to the urban fringe and the agricultural margins the heartland has for the most part been comparatively stable, it is certainly not a static region. With improved transportation and communication systems, the bulk of Canada's productive agricultural land has come under the influence of urban centres. Virtually all of the agricultural heartland falls within the urban shadow of one or more major urban centres. Relative to urban centres, the rural regions have lost influence and political power. The attitudes that formerly differentiated rural society from the urban one have been dissolving—an indirect result of the pervasive urban-based communication and transportation system that has made the heartland an urban hinterland.

In general, however, changes in the use of agricultural land in the heartland are powered by changes in the supply and demand for agricultural products, an important process also with respect to the agricultural margins. These economic factors, in turn, may be directly affected by such considerations as the perception of the value of labour, the returns expected from different kinds of enterprises, the economic and policy decisions of government, and changes in the farmer's perception of what constitutes a decent standard-of-living.

The Canadian agricultural heartland has two components: the east and the west, roughly dividing west of Lake Superior. During the period 1961-1976, most areas of the east characterized as rural heartland lost from 15 to 25% of their farms and nearly 20% of all farmland (see Table 3.1 and Appendix D). From 1961 to 1976, the average farm in the eastern heartland grew by 20% to a size of 70 hectares, of which about 70% was improved land.

Irrigated farmland around the Oldman River in Alberta is part of the western heartland.
George Hunter, NFB Phototheque

Grains are important crops throughout the advancing frontier in the Peace River region.
E.W. Manning

In contrast, the western heartland is marked by extensive farming, larger holdings, general gains in farmland and improved land, and less urban influence. The average farm of the western heartland in 1976 was over 300 hectares in size, having grown 30% since 1961. Sixty-five percent of the area in farms was in improved agricultural practice. From 1961 to 1976, the western heartland gained 2% in farmland area and 9% in the area under improved agricultural practice. At the same time, however, over 20% of the 1961 farms disappeared, showing a trend to consolidation and to some abandonment of land because of salinization and loss of organic materials (Vander Pluym, *et al.*, 1981; Bentley, 1981b).

The heartland (both east and west) contained 82% of the nation's farms in 1976, up 4% from 1961. In 1976, the heartland also contained 89% of the nation's farmland, 91% of the nation's improved land, and 91% of the value of the nation's farms. Therefore, any changes in the use of land in the agricultural heartland are central to the success of agriculture in Canada.

The Agricultural Margins

In Figure 3.1, two kinds of agricultural margins are identified: the advancing agricultural frontier and the retreating margin. Both areas are economically marginal, due to a variety of physical, economic, and social factors.

The Advancing Frontier

Canada's agricultural frontier is advancing in the west. Areas of the northwest, primarily in northern British Columbia, districts of Alberta, and Saskatchewan, have had the greatest advances in the agricultural frontier with vast areas of new land being brought into agricultural production. Factors contributing to the advancing frontier in the west include:

1) technological advances in crop varieties that tolerate shorter growing seasons and possess greater frost resistance;
2) a period of relatively good markets for grains, oilseeds, and beef;

The Advancing Frontier in the Peace

The Peace River region of Alberta and British Columbia is the best contemporary Canadian example of the advancing agricultural frontier. The region is in northwestern Canada between 50° and 60° latitude and is bounded by the Rocky Mountains on the west and south and by the highlands north of Lesser Slave Lake on the east. While the total area is over 16 million hectares, only 8 million hectares are arable (Elliot, 1974). Less than 1.9 million hectares were in improved agriculture in 1976, up from 1.1 million hectares in 1961.

The region is a frontier in many ways: it is one of the most recent parts of Canada to be opened for settlement and it is where the most significant additions to farmland have been made. Fur traders, gold seekers, and eventually homesteaders were the first to settle the region early in the twentieth-century. After World War Two, settlement became less fragmented, and today agriculture employs the majority of the population and provides the region with a vigorous economic base. The economy has also been strengthened by a recent boom in natural gas exploration and development.

The region has a growing season of approximately 60-100 days lasting from early May to September and an Agroclimatic Resource Index (Williams, 1975) varying between 1.0 to 1.3, permitting the cultivation of new varieties of rapidly-growing grains. The bulk of the region has CLI class 2 and 3 agricultural soils suitable for most forms of agriculture, and there are some class 1 soils in the valley bottoms as well.

From 1961 to 1976 there was a 61% increase in the area under improved agricultural practice, with 730,000 more hectares in the improved agricultural base. The largest increase was in improved pasture (149%), followed by land in crops and fallow. In addition to the increases in pasture in the 15-year period, there was major development in grains, especially in rapeseed. However, farm consolidation in the region has also led to a modest decline (11.7%) in the number of farms. The average farm in the Peace River area in 1961 was 180 hectares and by 1976 this size had increased to 313 hectares. Despite its marginal agricultural climate, this region continues to be where most of the expansion of agriculture in Canada is taking place. The result is a significant addition of farmland both from a national and regional perspective.

3) establishment of basic transportation and farming infrastructure through a variety of provincial and federal government programs as well as an influx in private capital;
4) advances in equipment technology permitting rapid, inexpensive land clearing and easy tillage;
5) individuals with an interest in developing new farms for both non-economic and economic reasons;
6) availability of untapped land areas with reasonable agricultural capability;
7) availability of capital for farm enlargement and consolidation through profits, government loans, and private lending institutions.

The advancing frontier, as defined in this paper, stretches across the northern prairies and northern B.C. In the east, only Newfoundland shows any advances, which, though important locally, are nationally insignificant relative to the gains in the west. From 1961 to 1976, the advancing margins gained 60% in farmland area, adding 1.4 million hectares to the Canadian agricultural base. Most of this advance occurred in the Peace River district. Even with this immense expansion of the area in farming, the number of farms remained constant, showing an increase in average farm size of over 60% to 284 hectares in 1976.

The advancing frontiers are generally areas of lower agroclimatic capability than the heartland and can produce only a limited range of hardy crops. The quality and quantity of land remaining to be brought into farming is diminishing, as is the rate of advance of the frontier. Frontiers like the Peace River region will, in time,

A Retreating Margin: The Gaspé Peninsula

The Gaspé Peninsula (Bonaventure, Gaspé East and West) is separated from the rest of Quebec by the St. Lawrence on the north and from New Brunswick to the south by the Bay of Chaleur. The land was claimed for France by Jacques Cartier in 1534. Its harsh climate and dense forests have never been conducive to settlement. The peninsula has only a few pockets of class 2 and 3 soils (26,917 hectares) suitable for cropping and these are located along the coastline.

The Gaspé is a classic example of a retreating margin. Between 1961 and 1976, there was a 74% reduction in the number of farms and a 52% (28,878 hectares) loss of improved land over the entire peninsula. The value per farm in 1961 was $6,950 and increased to $31,084 by 1976 due to farm consolidation. The number of farms with sales greater than $1,200 decreased by 14%. The losses noted in the peninsula could be attributed to the abandonment of economically marginal farmland, much of which was class 4 or worse. Commercial farms over the 15-year period were devoted primarily to dairy cattle and the production of field crops (Dominion Bureau of Statistics, 1961a, and Statistics Canada, unpublished data).

In 1963, BAEQ (Bureau d'amenagement de l'est du Québec or Eastern Quebec Planning Bureau) was incorporated. BAEQ was an ARDA program financed equally by the federal and provincial governments. The primary aim of the plan was the elimination of disparities in employment and income between the region and the west of the province. The plan outline dealt with eight economic sectors that included agriculture. The Gaspé was designated as a special area for experimental action (Bureau d'amenagement de l'est du Québec, n.d.).

The BAEQ plan outlined some recommendations that would be instituted over time. The first was to develop agriculture into a productive activity with dairy farming as its primary focus and with secondary emphasis on beef and sheep farming. It also proposed the complete elimination of farming in marginal areas. Farms were to be consolidated to a viable size, defined as one or two units of 101 hectares and 65 milking cows. An optional pension plan was offered to farmers aged 55 and over who were willing to leave farming and a bonus was given to those willing to relocate within a city. Remaining farmers were offered training and reorientation by supervised personnel.

Much of the retreat of agriculture in this area can be traced to this program. In this instance, the significant retreat of the margin was the result of a specific government program designed to rationalize land use in the Gaspé region.

probably become new parts of the heartland, as the gains are consolidated, as infrastructure grows to satisfy needs, and as rapid growth matures into a stable agricultural base. However, a 1°C cooling of mean temperatures in each month would eliminate nearly all of these frontier areas from the production of wheat, barley, rapeseed, and most of the other limited number of crops they are now able to grow (Williams, 1975; Simpson-Lewis, *et al.*, 1979, 50).

The Retreating Margins

All provinces in eastern Canada, with the exception of Newfoundland, lost agricultural land between 1961 and 1976; these same areas also lost farmers and some of the land under improved agricultural practice. The retreating margins, however, had the greatest losses, losing 52% of their farms from 1961 to 1976 (see Table 3.1).

The retreating margins lost 38% of their farmland and 29% of their improved land in 15 years. Land with good agricultural capability was abandoned as was physically marginal land. In the margins, the value per farm and value per hectare fell significantly relative to the national average (Table 3.1).

These retreating margins are a good example of what Myrdal (1957) describes as circular and cumulative causation. Retreat is initiated by an inability to make ends meet, which can be the result of poor land, uneconomically-sized units, loss of markets, or difficulty with obtaining capital or credit. Farmers in marginal areas often cannot cope with uncertain conditions, because of age, limited cash flow, insufficient skills, and lack of confidence in the future of farming in the area (Beattie, *et al.*, 1981). Once the retreat from agricultural land reaches a certain level, the minimum economic thresholds required for much of the physical and human infrastructure that support a viable agricultural industry no longer exist. The result, in many cases, is a withdrawal of such infrastructure elements such as rail lines, road transport services, feed and machinery distributors, and farm-produce collection centres (e.g., dairies and grain storage facilities). The departure of such services can further discourage the remaining viable farms and they, in turn, may fold as their costs increase and as the services critical to the farm or the farming region disappear.

An abandoned farm in central New Brunswick.
E.W. Manning

In some areas, such as the Gaspé Peninsula and parts of northern New Brunswick, there have been losses of more than 75% of the farms during the 15-year study period. These losses were accompanied by population dislocations and in many cases by abandonment of farmland. The areas showing the greatest degree of farmland abandonment were generally characterized by small, under-capitalized farms, fragmented agricultural holdings, and low levels of infrastructure (Dominion Bureau of Statistics, 1961, 1966). However, many well-run farms on good land have also been abandoned because of the cumulative effect of the types of factors listed above. (The Canadian literature on the use of marginal agricultural land and the causes and consequences of the marginal condition are examined in greater detail by Beattie, *et al.*, 1981).

The Bottom Line

This chapter has identified the major agricultural zones of Canada, characterizing them and discussing briefly some of the problems and their respective causes in each zone. The net result from a Canada-wide perspective is that the nation's agricultural base has shifted towards the west. While there are significant problems for agriculture in the urban fringe (Bryant, 1976; Russwurm, 1974) and on the frontier and margins (Beattie, *et al.*, 1981), what happens in the heartland is central to the viability of the nation's agriculture. The western heartland has remained relatively stable and has expanded, while in the eastern heartland there have been significant downward trends in the farmland base. Although production has been more than maintained, the continuing loss of substantial agricultural resources in the eastern heartland is significant because of the high quality of the land resource and the persistent downward trend.

Only about 10% of the loss of agricultural land in Ontario (containing much of the eastern heartland) can be attributed to urban development. Even if such activities as hobby farms and extraction account for two to three times the loss attributable to urban development, two-thirds of the loss of agricultural land is still left unexplained.

The preservation of agricultural land was part of an election platform on Vancouver Island in 1981.
J.D. McCuaig

Chapter Four

THE CHANGING USE OF AGRICULTURAL LAND: THE CASE OF THE SAUGEEN VALLEY

What happened to the agricultural land that was lost? This land had to be converted from farming to something else. By far the most important changes in agricultural land occurred in the eastern heartland, which from 1961 to 1976 lost 17% of its farmland and 9% of its improved agricultural land. Here, the quality of the land and the high productivity of the resource make any substantial loss of farmland nationally significant.

This chapter will answer the question of what happened to the land in one particular part of the eastern heartland, the Saugeen Valley. In examining the process of agricultural land loss within the eastern heartland, the study will analyze the effect of various social and economic factors on individual decision makers. The method of analysis necessarily involves direct contact with the final decision-maker—the landowner. Only through detailed case-study analysis in one area of the eastern heartland is it possible to trace the impact of individual factors on the rural tapestry. The case study will permit identification and analysis of the causes and processes of agricultural land-use change; these can probably be expected to be found (varying in magnitude and relative importance) elsewhere in Canada. The case study can therefore assist in the interpretation of the national trends and relationships discussed in previous chapters.

Why the Saugeen Valley

The Saugeen Valley is located in Bruce and Grey counties of Ontario, with a small portion in the north of Wellington County (see Figure 4.1). For the purposes of this study, the Saugeen Valley has been defined as those 21 townships which closely correspond with the watershed of the Saugeen River. The region is the administrative area of the Saugeen Valley Conservation Authority. The Saugeen Valley was selected for this study because of its physical diversity, its location away from major urban centres, and its long history as a productive farming region of the Ontario heartland. Because the study area is distant from direct urban influence, changes in land use are generated primarily from within the agricultural sector.

While the Saugeen Valley is not intended to be statistically representative of Canada or of the heartland, this area exhibits the characteristics of most heartland land-use trends (see Table 4.1). From 1961 to 1976, 58,540 hectares of farmland (11.9% of the 1961 farmland base) disappeared from census farms in the valley. The relationship of the Saugeen Valley to these and to other national and agricultural heartland figures provided in the previous chapters is shown in Table 4.1. The good correspondence for most variables between the Saugeen and the eastern heartland make it possible for the Saugeen Valley to serve as a laboratory in which many of the changes and processes occurring in the eastern heartland can be examined.

The Saugeen Valley accounted for 6.1% of the area lost from Ontario's farmland base from 1966 to 1971. The Saugeen shows some deviation from the eastern heartland average with a greater increase in value of land and buildings and a lower rate of farmland loss. However, the national and heartland trends of a greater ratio of improved land to unimproved and of increasing average farm size are also apparent here.

Within the context of the rural heartland, this specific case of rural land-use change is examined with emphasis on the period 1966-1976. The Saugeen Valley case study will make it possible to assess social, economic, and environmental factors related to land-use change, as well as the impacts on rural land use of the projects, policies and programs of various levels of government. This chapter will describe what land-use changes occurred in the valley. The factors contributing to these changes, how individual farms and farmers are affected, and how the decision process functions as a cause of agricultural land-use change in the study area will all be investigated later.

The Method of Analysis

There are three major data sources for analysis of the Saugeen case:

1) the Agricultural Census;
2) Land Use and Capability Surveys;
3) 480 Landowner Interviews.

Woodlots are a feature of many Saugeen farms.
J.D. McCuaig

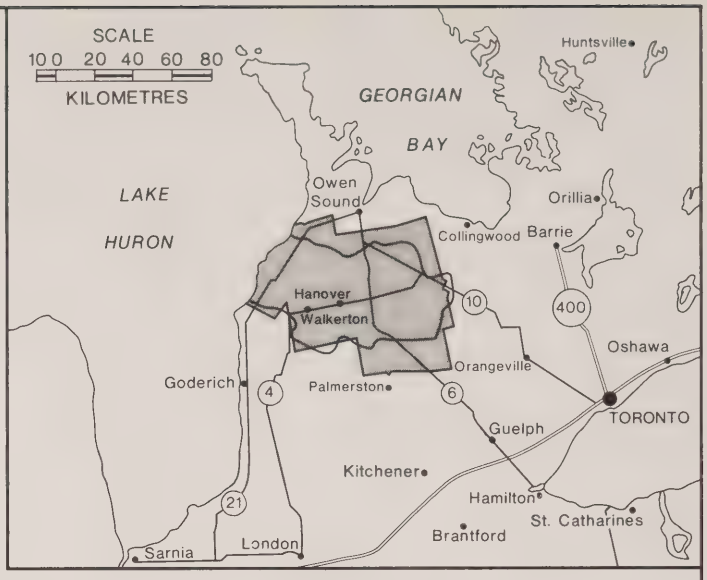
FIGURE 4.1

LOCATION MAP OF THE SAUGEEN STUDY AREA

LEGEND

SAUGEEN WATERSHED

SAMPLE AREA



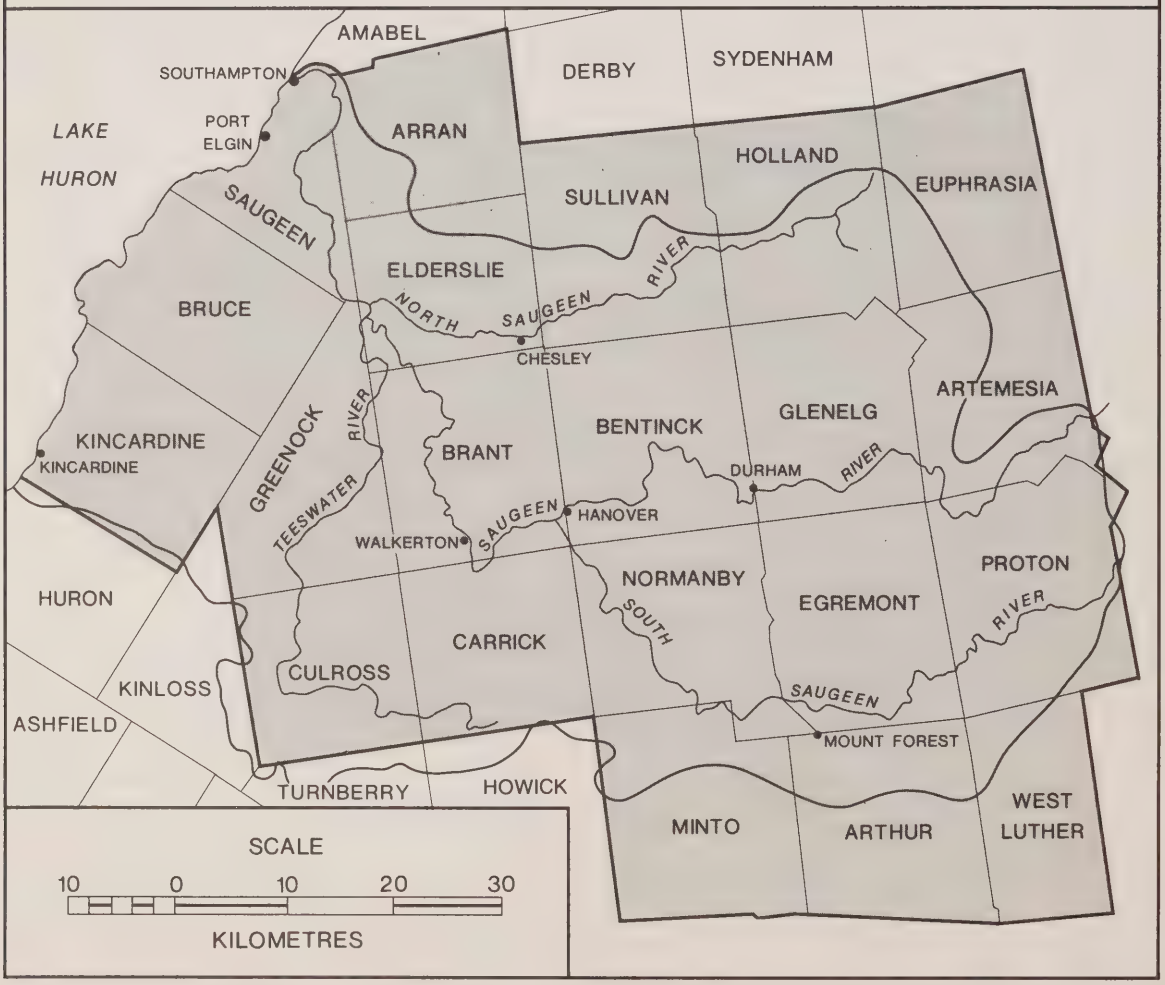


Table 4.1

The Saugeen Valley in the National Context

Agricultural Trends	National	Heartland (East and West)	Eastern Heartland	Saugeen
Change in Farmland 1961-1976	-2.0%	-0.57%	-16.6%	-11.8%
Change in Improved Land 1961-1976	+5.6%	+6.3%	-9.1%	-7.4%
Change in Number of Farms 1961-1976	-29.5%	-25.3%	-30.5%	-24.0%
Change in Value of Lands and Buildings 1961-1976	+405.0%	+428.0%	+406.0%	+522.0%
Land Value per ha 1961	$123.69	$123.56	$ 321.13	$ 213.23
Land Value per ha 1976	$637.62	$656.41	$1,955.13	$1,505.91
Change in Land Value per ha 1961-1976	+416.0%	+431.2%	+507.7%	+606.2%
Average Farm Size 1961	145.0 ha	162.0 ha	58.0 ha	66.1 ha
Average Farm Size 1976	201.0 ha	216.0 ha	70.0 ha	76.6 ha
Change in Average Farm Size 1961-1976	+38.6%	+33.3%	+20.7%	+15.9%
Improved Area per Farm 1961	87.0 ha	100.8 ha	38.5 ha	47.7 ha
Improved Area per Farm 1976	131.0 ha	143.4 ha	50.3 ha	58.1 ha
Change in Improved Area per Farm 1961-1976	+50.5%	+42.4%	+30.6%	+21.8%

SOURCE: Statistics Canada - Census of Agriculture figures 1961, 1976 processed for SCD boundaries, using Small Farms Census information for 1976 (sales greater than $50).

The Agricultural Census of Canada provides considerable information at the township level concerning agricultural activities and land use within the valley. A special run of census data, with consistent census farm definition over the study period, has been provided by Statistics Canada. The census farm definition used includes all properties over .4 hectares (1 acre) with at least $50 sales of farm products (the same data set and definitions used for the national analyses in previous chapters).

The land use and capability surveys utilized as base data sources for the study include:

1) The CLI Land Capability Classification for Agriculture (Environment Canada, 1976);
2) Land-use mapping (1952) for the upper watershed from the *Saugeen Valley Conservation Report* (Ontario. Department of Planning & Development, 1952) for historical background;
3) The CLI Land Use Classification (1966-67) for all 21 townships (original manuscript maps and Canada Land Data System processing, see Appendix C);
4) A special land-use mapping (1976) survey carried out by Environment Canada, Lands Directorate, Ontario Region, for most of the 21 townships (Coleman, unpublished, 1977, and Canada Land Data System processing).

While there are minor timing differences in the data sources, all focus on the 1966-67 and 1976-77 periods. For the purpose of clarity, the study period for the Saugeen will be called 1966 to 1976 throughout the remainder of this paper and should be taken to include the 1966-67 and 1976-77 sources.

The CLI and mapping survey (Nos. 1, 3, and 4 above) have been overlaid and linked to census data using the Canada Land Data System (see Appendix C); this

overlay has allowed analysis of land-use change, indicating what happened to land use within the region from 1966 to 1976 when the most change according to census sources was seen to occur. Land-use maps of the Saugeen Valley for 1951 to 1961 would have also been useful but none exist for 1961 and the 1952 coverage is crude and limited in extent (see Figure 4.3).

In addition to the census and map materials, a questionnaire was administered to a randomly-selected sample of 480 valley landowners.* Each interview, conducted by trained local interviewers in the winter of 1977-78 and focussing on the 1977 crop year, covered a total of 250 direct and derived variables. The subjects included information on landowners, history of land ownership, history of land use, and present land use. Facts were gathered on the present crop and activity mix, use of machinery, recent farm alterations, investments, and technological modifications. In particular, the nature, extent, and reasons for any land-use changes were documented. The analysis of the questionnaire data was accomplished using the Statistical Package for the Social Sciences (Nie, *et al.*, 1975; Hull and Nie, 1979). More detail on the research program and questionnaire can be found in Appendix E.

* Separate random number tables were used to select township, concession, lot number, and lot quarter. The owner of each property identified from the assessment rolls was the respondent. Duplicates were rejected. Of the respondents identified, less than 1% refused to be interviewed and only 2% gave unusable responses. The survey included absentee landowners in London, Toronto, Kitchener, etc.

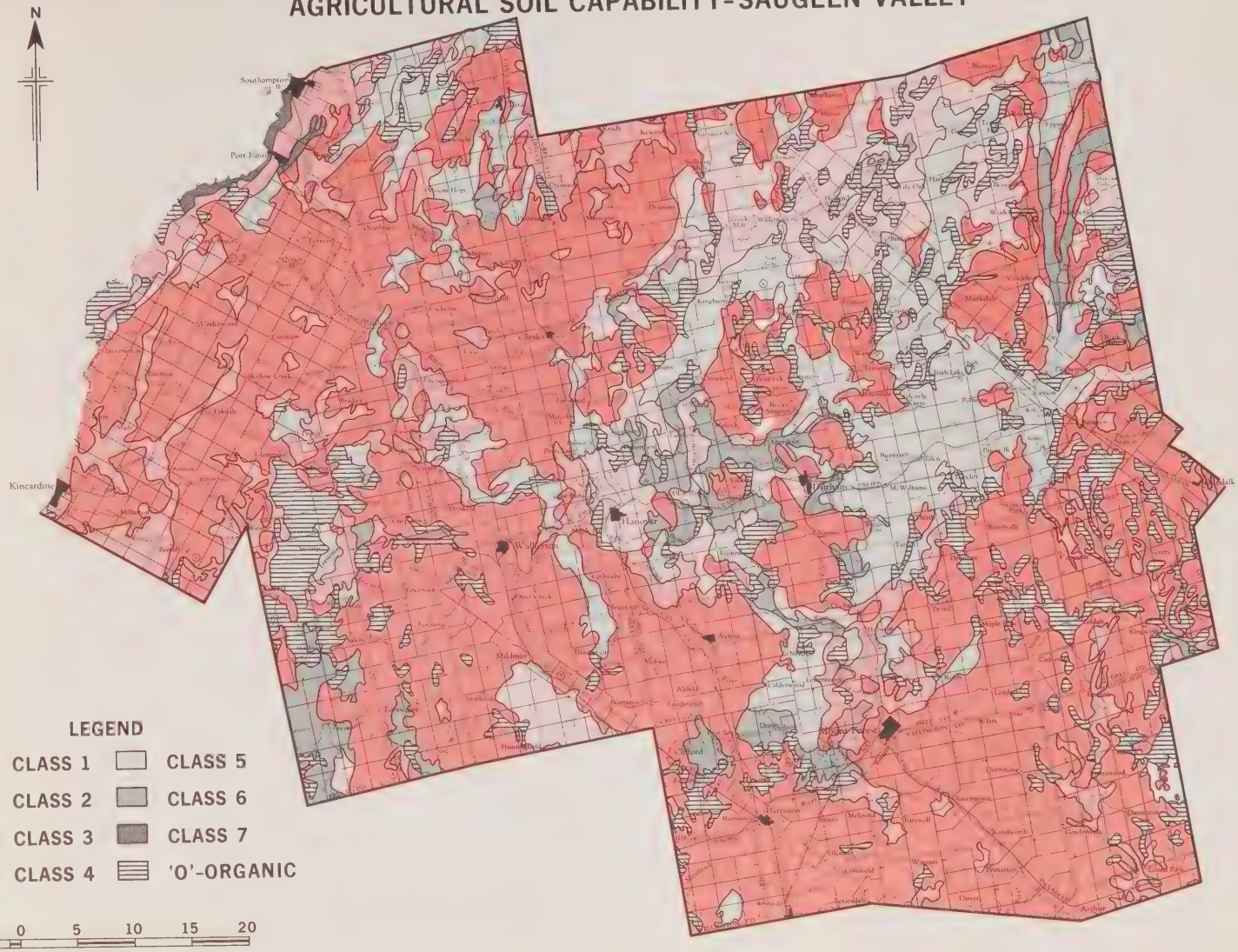
The Study Area

The Saugeen Valley is located east of Lake Huron and south of Owen Sound, approximately 150 kilometers northwest of Toronto. The Saugeen Valley contains land with a broad range of agricultural capability classes, from class 1 through to class 7 (see Figure 4.2 and Table 4.2). Nearly seventy percent (69.4%) of the land within the Saugeen falls in agricultural classes 1 to 3 (land with cropping capability), so the region supports a wide variety of agricultural activities, including

Rolling countryside and farms in the Saugeen Valley, north of Hanover.
E.W. Manning

FIGURE 4.2

AGRICULTURAL SOIL CAPABILITY-SAUGEEN VALLEY



SOURCE: CLI; GENERALIZED FROM MAP SHEETS BRUCE 41 A AND KITCHENER 40 P.

Table 4.2

Percentage of CLI Agricultural Classes by County, Saugeen Valley

County	Agricultural Capability Class (percent of total of each county)									
	1	2	3	4	5	6	7	Organic (O)	Unclassified*	TOTAL
Bruce	53.1	18.0	7.4	2.3	8.3	1.8	0.8	8.0	0.3	100.0
Grey	31.9	6.5	18.9	5.5	21.1	3.6	0.0	12.2	0.2	100.0
Wellington	70.9	7.6	7.3	1.6	0.6	2.7	0.0	8.9	0.3	100.0
% TOTAL	45.5	11.1	12.8	3.7	13.4	2.8	0.3	10.1	0.3	100.0

* Unclassified = water and built-up areas.

SOURCE: CLDS/CLI Maps.

high intensity and prosperous dairy farming, field cropping, fodder production, and market gardening. The predominant agricultural activity in 1976 was mixed farming, specializing in beef, with hogs, poultry, and sheep also important but secondary. The crops grown were primarily fodder crops for beef and included hay, oats, barley, and corn, with some wheat also grown. There were a few specialized farms, including trout farms, seed crops, turnips, and market gardens with such crops as cabbages, carrots, and beans. As demonstrated in Figure 4.2, the land with greater agricultural capability is located in the western portions of the valley, in the vicinity of Lake Huron. The region is also a reasonably attractive area for cottaging, hobby farming, and other recreational activities, though, with the exception of communities on the Lake Huron shore, it is not generally a prime tourist or recreational destination for major urban centres. The region has a long-standing history of forestry with an associated furniture manufacturing industry. Since the forest resource of the region, particularly the hardwoods, has been depleted, sources have been sought outside the region. There is some private reforestation and continuing woodlot management, as well as Conservation Authority and Ontario Ministry of Natural Resources forests.

Within the region there are a number of small towns providing the infrastructure to serve the agricultural community. The largest of these are Port Elgin, Walkerton, Hanover, Durham, and Mount Forest. Port Elgin, Southampton, and Kincardine are recreational service centres. There are also many smaller communities throughout the Saugeen, offering a rich pattern of community development and assorted rural services. The Douglas Point Nuclear Generating Station, near Port Elgin, provides an opportunity to analyze the specific impacts of a large development on the land use of part of the study area.

The Saugeen Valley cannot be considered as urban fringe. The nearest metropolitan centres are Toronto and Kitchener, but they are beyond a reasonable commuting distance (150 and 100 kilometers respectively). Many researchers would consider the Saugeen to be in the urban shadow or urban field (see Friedmann & Miller, 1965; Hodge, 1972), because it falls within the range of weekend recreational use (a 1-2 hour drive). Many of the businesses of the region are serviced on a daily or weekly basis from Toronto or Kitchener. The area does not come under direct pressure for the urban subdivision and servicing associated with large and growing urban centres. The towns are growing,

however, with the same, though smaller-scale, problems associated with urban expansion (e.g., O. Magwood *vs.* Hanover, Ontario Municipal Board hearings, 1979, concerning the attempted expansion of the Town of Hanover to include a productive dairy farm).

Agriculture and forestry have historically been the primary activities in the Saugeen Valley since the early European settlement in the mid-19th century. Prior to this, the Petun Indians of the area were also involved in agricultural pursuits. By the 1900s, agriculture was well established as the major economic activity over the entire valley. According to the *Saugeen Valley Conservation Report* (1952), agriculture in mid-century was "mainly of the mixed farming type. That is, the farm income [was] usually derived from more than one source" (p. 29). Cattle raising was the most important of these income sources, with hogs, poultry, and in some cases sheep supplementing as well. There was some cash cropping, with wheat, flax, and seed crops, but most of the land was in pasture or fodder crops. The average farm size in 1951 was 62 hectares, with most of the farms falling between 28 and 96 hectares.

This range in average size is indicative of the farm economics of the time which allowed small family holdings to survive and even prosper with good management. As will be seen, this is not necessarily the case today.

The Saugeen Valley in mid-century provides a reference point for the discussion of subsequent trends and changes. In 1951, there were 8,358 census farms in the valley totalling 517,776 hectares, of which 361,464 hectares, or almost 70%, was classed as improved land. The 1952 map (see Figure 4.3) of the upper watershed is included simply for historical reference, since the area covered is only about one-third of the study area. This map demonstrates the 1952 land-use pattern, with concessions and straight-line boundaries, and indicates the mix of agriculture and forestry in the area.

Clearing land in central Ontario, 1856.
Thomas Connon, Public Archives of Canada

Saugeen Valley Land Use—1952

Five classes of land use were recognized and mapped on the land-use survey:

1) Cultivated—field crops, pasture, hay, or fallow included in a crop rotation;
2) Pasture—unimproved land used for grazing, "wild" pastures and pastures seeded down for more than five years (i.e., longer than an ordinary crop-rotation period);
3) Woodland—forest recognized as woodland in the forestry survey;
4) Idle land—not carrying woodland and unsuitable or unused for cultivation or pasture;
5) Urban land—contained within municipalities or built-up.

Land use was mapped on a reconnaissance basis by blocks. The land use was observed and the percentages of each use estimated. In preparing the map, each block was assigned to a class as follows:

Cultivated:	more than 60% cultivated
Pasture:	more than 60% pasture
Forest:	more than 60% forest
(Since idle land is not extensive in the watershed, it was not included as a class.)	
Cultivated and pasture:	
Cultivated and forest:	when any two add up to 60%
Pasture and forest:	
Cultivated, pasture, forest, and idle:	where no two classes add up to 60%

The largest class of 1952 land use shown in the watershed was cultivated and forest, prevalent throughout the Holland Ridge, the Bentinck Whaleback Hills, and the Glenelg Gravelly Hills. Forest, in fact, dominated many of the blocks throughout these areas. Cultivated blocks were generally confined to the Hanover Rolling Plain and the Durham, Markdale and Dundalk Plains. Blocks of pasture or pasture and forest were more widely scattered.

Derived from *Saugeen Valley Conservation Report*, 1952, 32-34.

FIGURE 4.3

LAND USE IN THE SAUGEEN VALLEY
1952

SOURCE: ONTARIO. DEPARTMENT OF PLANNING AND DEVELOPMENT. 1952

Table 4.3

Selected Farm Data for the Saugeen Valley, 1951-1976

	1951	1956	1961	1966	1971	1976	Change 1966-1976
No. of Census Farms	8,358	8,188	7,472	6,813	6,080	5,681	-1,132
Area in Farmland (ha)	517,776	512,404	493,868	482,279	448,038	435,328	-46,951
Percent of Valley* in Census Farms	98.4	97.4	93.8	91.6	85.2	82.7	-8.9
Area in Improved Agr. Land (ha)	361,464	362,206	356,733	355,942	327,410	330,457	-25,485
Percent of Valley* in Improved Agr. Land	68.7	68.8	67.8	67.6	62.2	62.8	-4.8
Improved Land as % of Farmland	69.8	70.7	72.2	73.8	73.1	75.9	+2.1
Average Improved Area/Farm (ha)	43.2	44.2	47.7	52.2	53.8	58.2	+6.0
Area in Farm Woodlots (ha)	64,092	64,749	65,551	59,250	57,820	52,744	-6,506
Percent of Valley* in Farm Woodlots	12.2	12.3	12.4	11.2	11.0	10.0	-1.2
Average Farm Size (ha)	61.9	62.5	66.1	70.8	73.7	76.6	+5.8
Value of Land & Buildings ($)	63,344,983	N/A	105,126,700	138,507,500	218,770,900	654,433,915	+515,926,415
Average Value per Hectare ($)	122	N/A	212	287	488	1,503	+1,216

* Area in Valley as Mapped by CLDS 526,173.8 hectares.

N/A = not available

SOURCE: Census of Agriculture and CLDS.

Table 4.4

Crops and Livestock - Saugeen Valley, 1951-1976[a]

	1951	1961	1966	1971	1976
Tame Hay	91,979	95,734	102,426	91,676	99,316
Mixed Grain	59,855	52,413	62,697	57,339	56,912
Corn for Ensilage	3,297	4,757	9,217	14,808	29,445
Barley	9,565	2,931	8,494	12,742	13,226
Corn for Grain	498	428	1,677	4,861	13,037
Oats for Grain	40,497	40,817	18,783	7,576	5,424
Wheat	9,111	3,939	3,621	1,898	1,850
Tree Fruit	*	138	125	133	1,667
Other Vegetables	*	72	60	293	1,556
Oats for Fodder	554	1,535	904	644	977
Flaxseed	6,966	1,343	982	55	942
Other Fodder Crops	*	511	954	1,011	899
Buckwheat	1,419	380	478	442	789
Beans	*	20	35	48	729
Tobacco	2	198	237	149	303
Potatoes	61	292	201	21	259
Small Fruit	202[b]	31	38	18	253
Other Field Crops	202	*	36	124	224
Rye	446	372	276	172	224
Peas	309	26	46	15	72
Soybeans	34	N/A	45	36	57
Turnips	60	337	443	*	*
Livestock					
Total Cattle	194,494	269,196	295,707	210,045	349,041
Milk Cows	60,810	62,296	57,519	48,116	56,351
Pigs	161,576	158,423	171,956	193,481	128,620
Sheep	30,717	28,033	21,860	19,665	14,779
Hens and Chickens	1,299,542	1,408,604	1,249,014	1,526,058	1,687,781

SOURCE: Statistics Canada. Census of Agriculture. Unpublished data.

* Data not collected.
N/A = Not available.

[a] Crops are arranged in decending order of area for 1976.
[b] Includes vegetables.

Table 4.5

Summary Statistics for
Saugeen Land-Use Map 1966
(Figure 4.4)

Land Use 1966	Area (ha)
Orchards	118.6
Horticulture	43.3
Crops & Improved Pasture	348,555.9
Unimproved Pasture	30,145.7
Productive Woodland	130,271.3
Non-productive Woodland	12,185.9
Urban--Built-up	1,621.2
Mines/Quarries	1,004.5
Outdoor Recreation	1,427.4
Unproductive Land--Sand	18.6
Swamp/Marsh	770.1
Water	11.3
TOTAL	526,173.8

SOURCE: CLDS/CLI

In terms of area devoted to crops, the 1951 census shows that oats, mixed grains, and hay were the predominant crops (see Table 4.4), confirming the emphasis on livestock, especially on cattle. Note that corn was limited in 1951, though, by 1976, it had become an important fodder crop.

There were 194,494 cattle in the valley in 1951, with 31% of these being dairy cattle. The *Saugeen Valley Conservation Report* (1952) states that few farms were devoted primarily to the production of fluid milk and these were found mainly near the larger towns. Over 160,000 pigs, 30,000 sheep, and 427,000 chickens were also recorded in 1951.

In 1951, the average valley farm sold for $7,579 and farmland could be bought for about $120 per hectare (of course, land was only available in acres at that time). About 70% of the area in farms was improved land, with an average of 43 hectares per farm in improved practice.

The acceleration of national changes in land value and land use since 1951 has also been apparent in the Saugeen. By 1961, the area of farmland had dropped by 4.6% to 493,868 hectares and the number of commerical farms had fallen by 886 to 7,472 (see Table 4.3). By 1966, a further 659 farms had disappeared and only 482,279 hectares remained in farms (see Figure 4.4, Table 4.5). Thus, a gradual process of decline in farming had commenced.

Changes in Land Use, 1966-1976

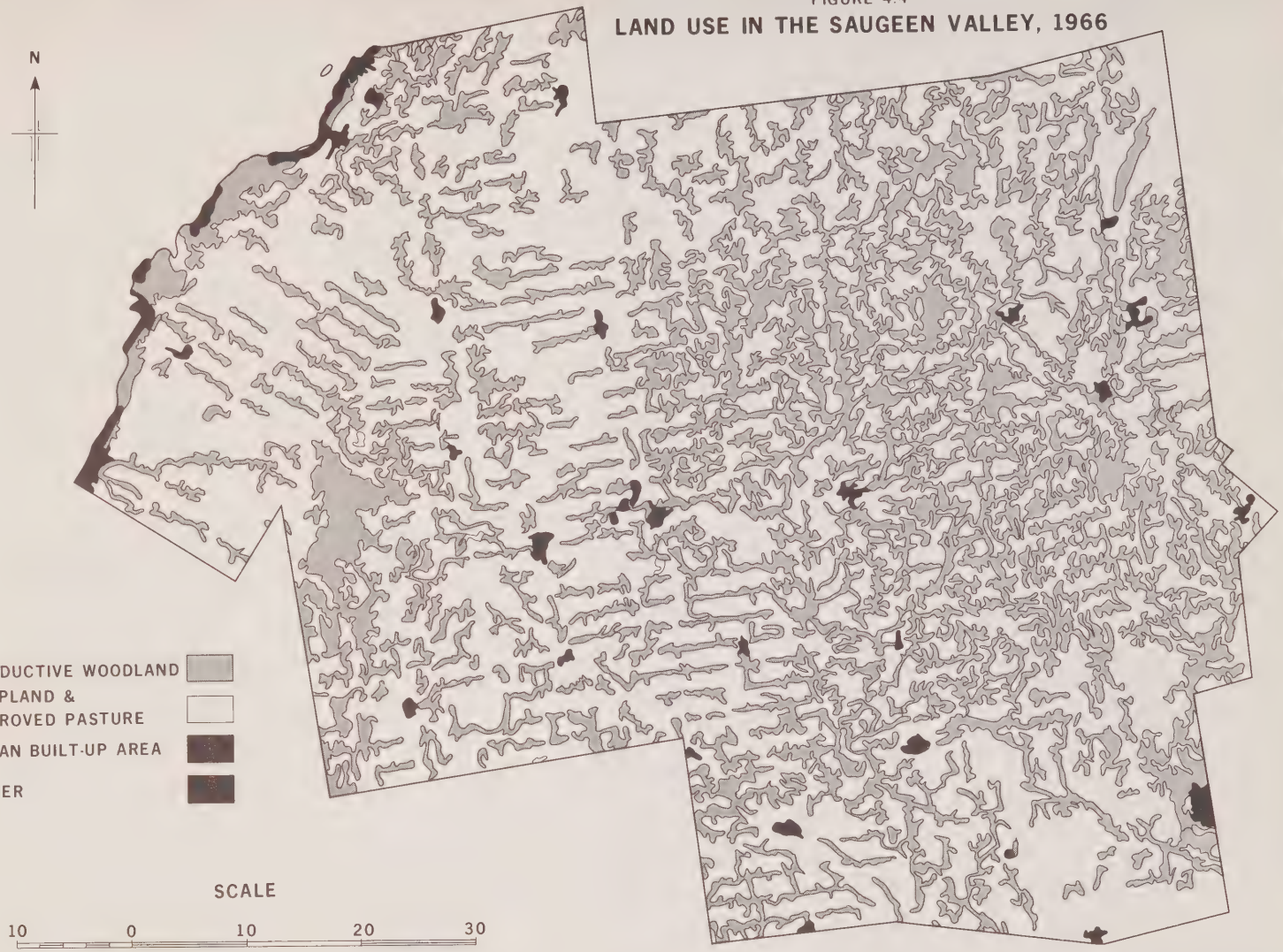
The decline in the agricultural land base of the Saugeen Valley accelerated after 1966. By 1971, only 448,038 hectares remained in 6,080 farms, and by 1976 these figures were further reduced to 435,328 hectares and 5,681 farms, representing a loss of 46,951 hectares or 9.7% of the land in farms from 1966 to 1976. This loss is by no means insignificant. Even more important is the 7.1% loss of improved land, representing 25,485 hectares that in 1966 was seen as physically and economically suitable for improved agricultural practices (see Table 4.3).*

The most rapid decline in the Saugeen agricultural land base occurred in the five-year period between 1966 and 1971, with 56.9% of the total 1951-1976 loss (see Table 4.3). An interesting contrast is the more recent 1971-1976 five-year period which showed a partial reversal in this trend; with a slower rate of loss of agricultural land, there was actually a net increase in the amount of improved land. Improved land represented 76% of all land farmed in 1976, up from 71%

* In comparison with the national figures in the previous chapters (based on 1961), the Saugeen losses from 1961 to 1976 were 58,540 or 11.8% of farmland and 26,276 hectares or 7.4% of improved land (see Table 3.1).

FIGURE 4.4

LAND USE IN THE SAUGEEN VALLEY, 1966



SOURCE: CLI; GENERALIZED FROM MAP SHEETS BRUCE 41 A AND KITCHENER 40 P.

Rocky outcrops limit agriculture near Williamsford in the Saugeen Valley.
E.W. Manning

in 1951 and 74% in 1966, indicating a continuing intensification of farmland use and a parallel with national heartland trends.

Land values, as shown in Table 4.3, have been rising rapidly, increasing by 423% from 1966 to 1976 with a 1976 value of over $1,500 per hectare. The significance of this trend in influencing the acquisition, use, and management of land will be explored in the following chapter.

During the 1960s and 1970s, agriculture continued to be the primary economic activity of the valley. However, other more urban and recreationally-oriented activities, such as hobby farming, rural residence, and cottage development, began to appear as significant land uses. Tables 4.5 and 4.6 show that built-up land, including cottaging, industrial and recreational areas, increased by 2,665 hectares from 1966 to 1976. An analysis of the relationship of land uses through the study period follows later in this chapter.

The land-use questionnaire revealed that 86% of landowners designated the primary use of their land as commercial farming, while 5% listed hobby or recreational farming, 4% noted residential, and 2% indicated recreational/residential (cottages, etc.) uses. The remaining owners were involved in commercial enterprises, such as forestry, or were owners holding their land vacant.

As in earlier years, one would describe Saugeen farming in 1976 as mixed, with emphasis on cattle. Beef was listed as the main farming enterprise by 39% of questionnaire respondents, dairying by 15%, and mixed farming by 12%. The most important crops according to the questionnaire and the census were corn and grain, with a large amount of improved pasture.

The changes in area of crops sown from 1951 to 1976 are shown in Table 4.4. Comparison of 1976 to earlier years indicates marked changes, the most obvious of

Table 4.6

Summary Statistics For
Saugeen Land-Use Map 1976
(Figure 4.5)

Land Use 1976	Area (ha)
Orchard	100.3
Crops	141,918.6
Pasture (Improved & Unimproved)	170,071.1
Forest	87,945.4
Scrub	33,161.5
Urban	1,835.7
Cottages	767.3
Extractive	1,399.5
Recreation, Park	1,805.8
Transportation	7.7
Urban Trailer Park	71.6
Dumps	4.0
Poultry/Fur Farm	43.8
Bruce Nuclear Stn	830.3
Other	53.8
TOTAL Mapped in 1976	440,016.9
Area Mapped in 1966 but not covered in 1976	86,156.9
TOTAL	526,173.8

SOURCE: Coleman, 1977, processed by CLDS.

which is the almost total decline of wheat and oats in favour of corn as a fodder crop. Hay remained at a constant high level. Flax seed almost disappeared, though there has been a slight resurgence in its cultivation since 1971. The number of beef cattle increased, with pigs and dairy cattle decreasing slightly.

The principal shift in crop management has been towards intensive monoculture cropping (Table 4.4). In nearly all cases, the crops in decline are less intensive than those showing gains. However, one of the consequences for the land base of intensive monoculture is the increased need for proper management and husbandry of the soil to prevent nutrient depletion, erosion, etc.

Figures from the random sample survey undertaken for this study show that some 14% of the entire watershed is in woodland; this is confirmed by the land-use survey carried out in 1976 (see Figure 4.5 in back pocket showing Saugeen Valley land use in 1976). According to the 1976 census, woodland represented 10% of all farmland, down from 12% since 1951. Woodlots were reported on 83% of properties surveyed. The average farm had a woodlot of 9 hectares; this small woodlot size is illustrated by the 1976 land-use map (Figure 4.6) with its many scattered pockets of forest land. Most respondents did not derive any income from their woodlot; in fact, when asked why they had one, 56% responded that the woodlot had "always been there." Some 14% indicated that they used the lot for personal firewood or intended to do so. With continuing increases in the price of fossil fuels, more landowners may turn to the use of firewood. In addition to farm woodlots, there were several large forestry holdings, generally associated with the local furniture industry or with provincial or Conservation Authority forests. The Greenock Swamp, one of the largest forest blocks in western Ontario, is also prominent on the map.

Extractive and energy-related activities were significant land uses for many property owners. The area devoted to sand or gravel extraction increased from 1000 hectares in 1966 to the point where, in 1976, there were 1400 hectares in this use. Eight percent of property owners interviewed reported extractive activities on their properties. Another significant industrial activity was the Bruce Nuclear Generating Station. Begun in 1962, this important facility occupied 830 hectares of valley land in 1976, and associated power lines have required major easements throughout the valley. Ten percent of the survey respondents reported easements.

Associated with changes in land use have been parallel changes in the number and size of agricultural land holdings. While some fragmentation of properties has been reported in the parts of the valley suitable for recreational/cottage use and on the periphery of some of the towns, the overall pattern has been one of farm consolidation. Table 4.7 shows a trend towards larger farm units, with the average farm size growing consistently from an average of 62 hectares in 1951, to 71 hectares in 1966, and to 76 hectares in 1976. (Table 4.1 shows the parallel national/heartland trend.) While the number of farms diminished by 17% from 1966 to 1976, the number of farms in the larger-size categories continued to increase. All farm categories over 97 hectares (40 acres) grew slowly and all below that size diminished. An interesting exception is the increase in the number of small farms from 1971 to 1976, indicating a growing number of hobby/recreational units. On the whole, data confirm the perception of fewer but bigger commercial farms, more intensive practices, and a growing trend towards specialized monoculture.

Where did the "Lost" Agricultural Land Go?

Table 4.3 indicates that the most rapid change in use of agricultural land in the Saugeen Valley occurred in the period 1966-1976. During this 10-year period, 47,000 hectares of land ceased to be part of census farms. To what alternative use was this land put? What changes in land cover and end use are hidden within the census figures?

To determine the changes in the use and cover of valley land from 1966 to 1976, a cartographic overlay approach was used. Land-use maps for 1966 (Figure 4.4) and 1976 (Figure 4.5) were overlaid and analyzed relative to each other, using the Canada Land Data System and producing both maps and tabular data on the land-use changes. The results show some intriguing changes in land use over the 10-year period and help to clarify the net changes identified in the census figures. Essentially what is provided in the following

Cattle and corn for fodder are an important part of agriculture in the Saugeen Valley.
J.D. McCuaig

section is a land budget (debits and credits) for the Saugeen Valley in terms of agriculture, forestry, and other land uses for the 1966-1976 period. While there were some changes in the classes of use, it was possible to standardize to agriculture, forestry, and other uses for analysis of shifts into and out of agriculture.

There were no large net changes in agricultural land discovered in the map comparison, though there were substantial shifts in the location of land in agricultural and forest use. Table 4.8 shows the relationship of land use in 1966 (horizontal axis) to land use in 1976 (vertical axis) for the 21 valley townships. While the overall amount of land classed as agricultural declined only modestly (.5% in 10 years), there were many major area shifts producing the net change. The principal destination of "lost" agricultural land was forest and scrub, with some movement into urban and extractive uses. Table 4.9 highlights the 1976 use/cover of land lost from agriculture since 1966. Approximately 9.5% of the land (27,390 hectares) classed for agricultural use in 1966 had converted to other uses by 1976. Conversely, 25,792 hectares shifted from other uses to agriculture over the same 10-year period (Table 4.10). While these shifts nearly balance each other in total area (net decrease of only 1,598.4 hectares), the gross changes produce a significant shift in the location and quality of lands involved in both agriculture and forestry.

The locational shifts of agricultural uses within the valley are shown in Figures 4.6, 4.7, and 4.8 and Table 4.11. The location of lands that left agricultural use are seen in Figure 4.6; these lands were concentrated in the northeast part of the region and consist of many fragmented parcels, most of which went into forestry

Table 4.7

Farm Size Distribution--Saugeen Valley

Size of Farm (in ha)	Number of Farms				
	1951	1961	1966	1971	1976
1-28	893	757	665	619	736
29-97	6,292	5,452	4,729	4,055	3,467
98-226	1,135	1,210	1,340	1,329	1,351
Over 226*	38	53	79	88	126
TOTAL NO. OF FARMS	8,358	7,472	6,813	6,092	5,681
AVERAGE FARM SIZE	61.9	66.1	70.8	73.5	76.6

* These data were originally collected in acres. The categories were 1-69 a., 70-239 a., 240-559 a., more than 600 a.

SOURCE: Statistics Canada, Census of Agriculture, unpublished data.

Table 4.8

Comparison of 1966 Land Use to 1976 Land Use in the Saugeen Valley*

(in hectares)

LAND USE IN 1976**		1976 \ 1966	LAND USE IN 1966**									TOTAL 1976
			AGRICULTURE			FORESTRY		OTHER				
			Improved Pasture & Cropland	Unimproved Pasture	Intensive Agriculture	Productive Woodland	Non-Productive Woodland	Urban	Extractive	Outdoor Recreation	Other	
	AGRICULTURE	Crops & Pasture	(1) 267,144	19,067	21	19,765	4,879	417	396	115	186	311,990
		Orchard	40	11	23	21	5	0	0	1	0	101
	FORESTRY	Forest	11,846	2,955	4	(2) 71,043	1,732	45	69	94	159	87,945
		Scrub	6,757	3,782	4	18,057	4,052	45	54	30	381	33,162
	OTHER	Urban	802	122	6	149	29	(3) 758	8	26	7	1,907
		Extractive	673	169	0	210	24	26	287	8	7	1,399
		Recreation	198	42	1	1,230	52	63	10	947	30	2,573
		Bruce Nuclear Generating Station	0	16	0	733	24	48	0	2	8	831
		Other	57	2	0	15	2	31	0	1	1	109
		TOTAL 1966	287,517	26,166	59	111,223	10,799	1,433	824	1,224	776	***

SOURCE: Canada Land Data Systems/CLI Maps.

* This table presents a simple comparison of the amount of land at each time classified in each category. Because all class units were not the same for both years, a grouping has been done to ensure consistent definitions (agriculture, forestry, other). The boxed areas represent land which remained agriculture(1), forestry(2), and other uses(3) from 1966 to 1976.

** Definitions used to distinguish agriculture from forestry from other uses were the same for the two land-use mapping programs, although within each major sector, the internal categories varied. For example, the 1976 categories of "crops and pasture" plus "orchard" equalled the 1967 categories of "improved pasture and cropland" plus "unimproved pasture" plus "intensive agriculture".

*** Totals do not add due to rounding.

NOTE: 86,157 hectares of the valley were not mapped in 1976. The figures given refer to 440,018 hectares, or 83.6% of the valley which were mapped in both 1966 and 1976.

Table 4.9

Destination Use (1976) of Land Lost from Agriculture since 1966--Saugeen Valley

Destination Use of Land Lost from Agriculture 1966-1976	Total Agricultural Land Lost	
(1976 use)	%	Actual (in hectares)
Forest	54.0	14,804.1
Scrub	38.5	10,542.3
Urban	3.2	875.8
Cottages	0.1	31.0
Extractive	3.1	841.9
Recreation	0.8	210.8
Transportation	0.1	7.5
Urban Trailer Park	0.2	44.3
Dump	0.1	0.9
Bruce Nuclear Station	0.1	15.7
Other	0.1	16.3
TOTAL	100.0	27,390.6 ha.

SOURCE: Coleman, 1977, processed by CLDS.

Loading feed grain and corn in Ontario's heartland.
Bruce Neumer, NFB Phototheque

Table 4.10

Former Use of Land Gained to Agricultural Use Between 1966 and 1976, Saugeen Valley

Land Use of Land Gained to Agriculture 1967-1976	Total Agricultural Land Gain	
(1966 use)	%	Actual (in hectares)
Non-productive Woodland	18.9	4,883.7
Productive Woodland	76.7	19,789.1
Outdoor Recreation	0.4	114.6
Urban*	1.6	422.3
Mines/Quarries	1.5	396.2
Unproductive Land-Sand	0.1	2.6
Swamp/Marsh	0.7	184.3
Water	0.1	0.4
TOTAL	100.0	25,793.2

* Land was classed as urban in 1967 because it was within boundaries of urban areas.

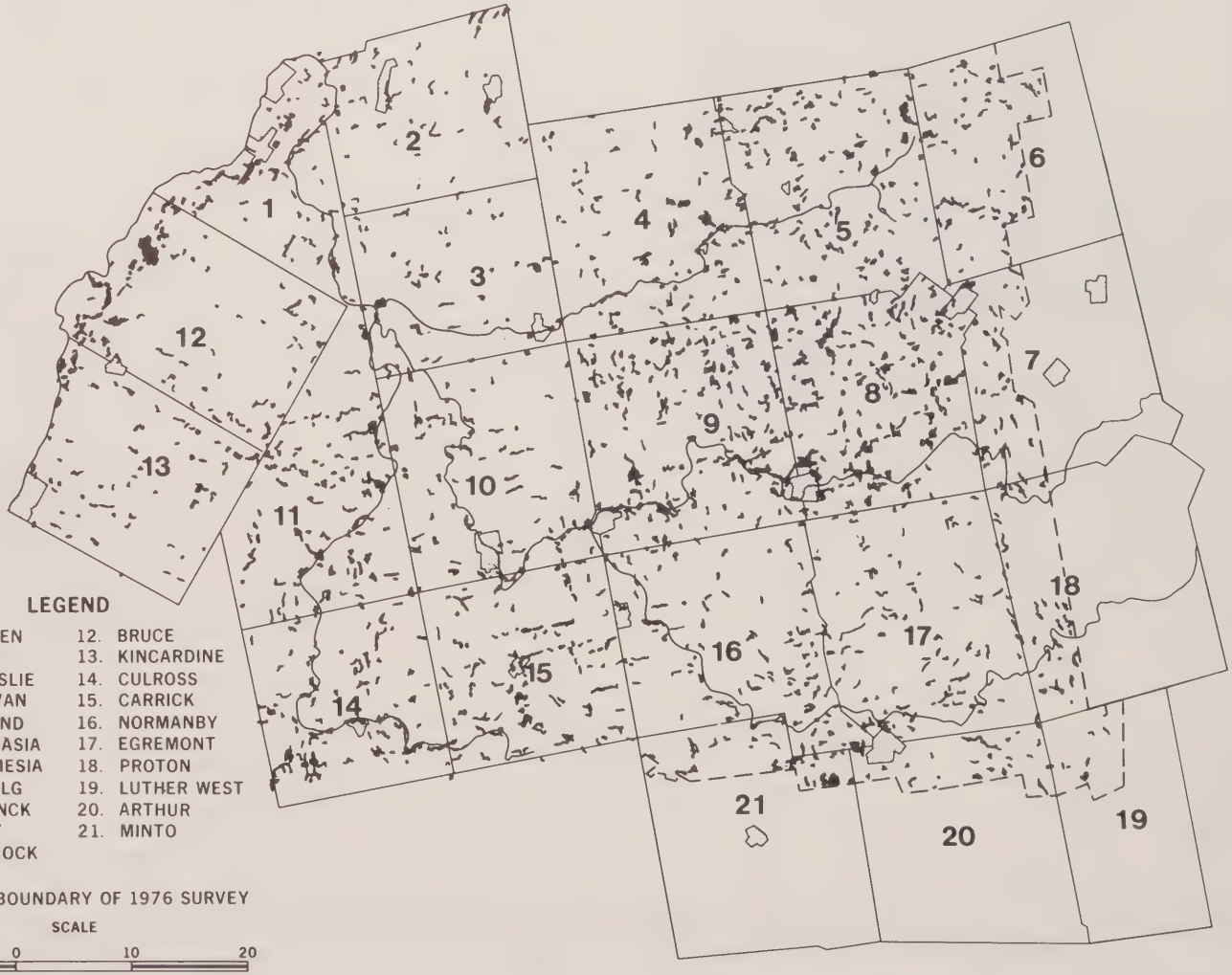
SOURCE: CLDS.

or reverted to scrub. The greatest losses of agricultural land were in the townships of Holland, Glenelg, Euphrasia, Bentinck, and Artemesia, the same areas which, according to the agricultural census, lost the most land from census farms from 1966 to 1976 (see Table 4.11). Figure 4.7 indicates that the addition of land to agriculture from 1966 to 1976 was concentrated in the south and west of the valley, and reference to the 1976 land-use map (Figure 4.5 inside back cover) shows an infill of previously unused parcels in the predominantly agricultural areas of the valley. The key gains in agricultural land occurred in the townships of Normanby, Elderslie, Brant, and Kincardine, where the net loss of census farmland was also lowest.

There was a major difference in the quality of land gained to agriculture and that lost from agriculture in the valley. The land brought into agriculture was generally superior in capability to that leaving agriculture.

FIGURE 4.6

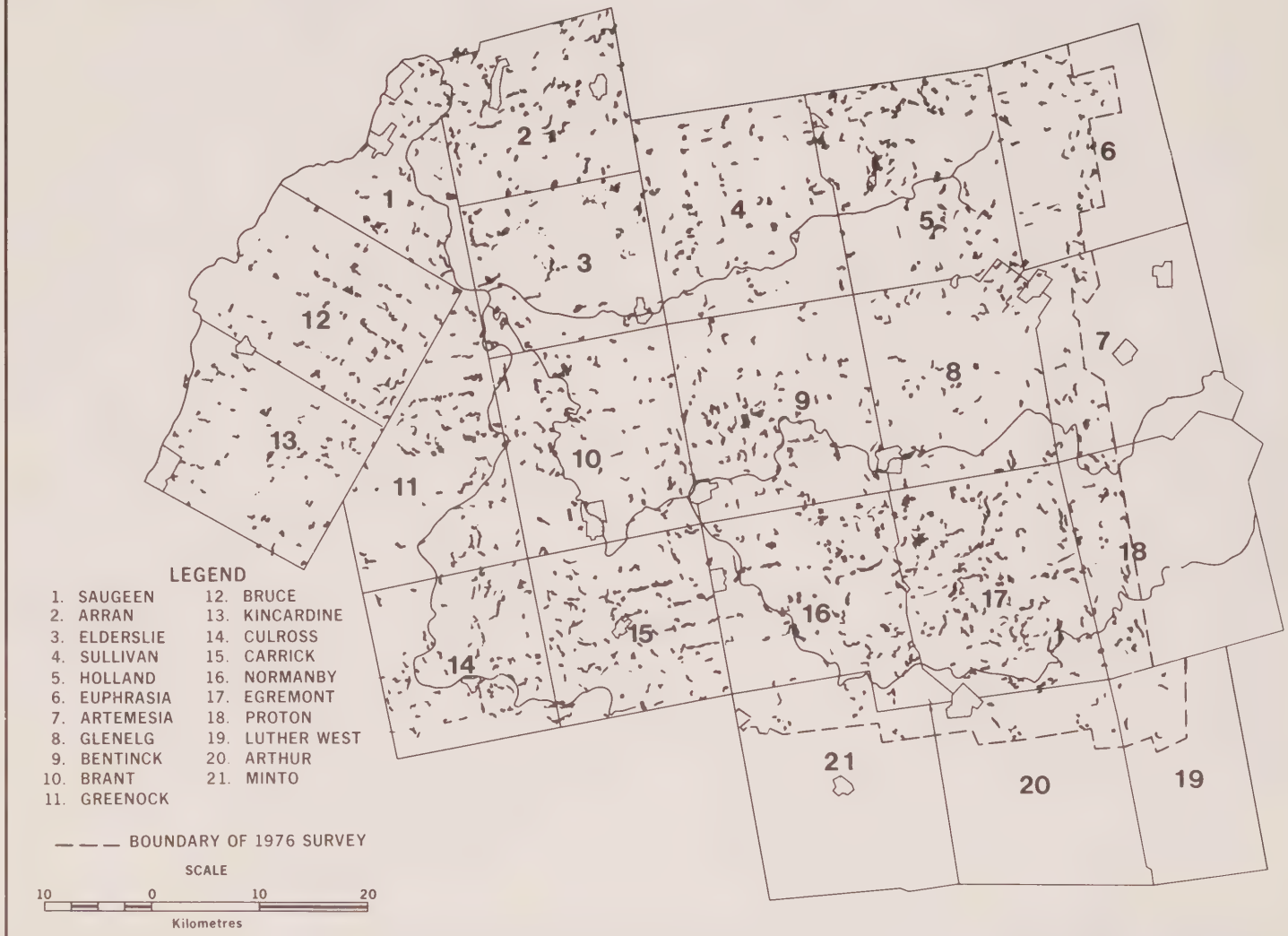
LAND LOST FROM AGRICULTURE



SOURCE: CLDS CANADA LAND DATA SYSTEM

FIGURE 4.7

LAND GAINED TO AGRICULTURE



SOURCE: CLDS CANADA LAND DATA SYSTEM

FIGURE 4.8

CENSUS LOSS AND GAIN OF TOTAL FARM AREA 1966-1976 SAUGEEN

LEGEND

GAIN

5-14.9% LOSS

0-4.9% LOSS

> 15% LOSS

SAUGEEN WATERSHED

SAMPLE AREA

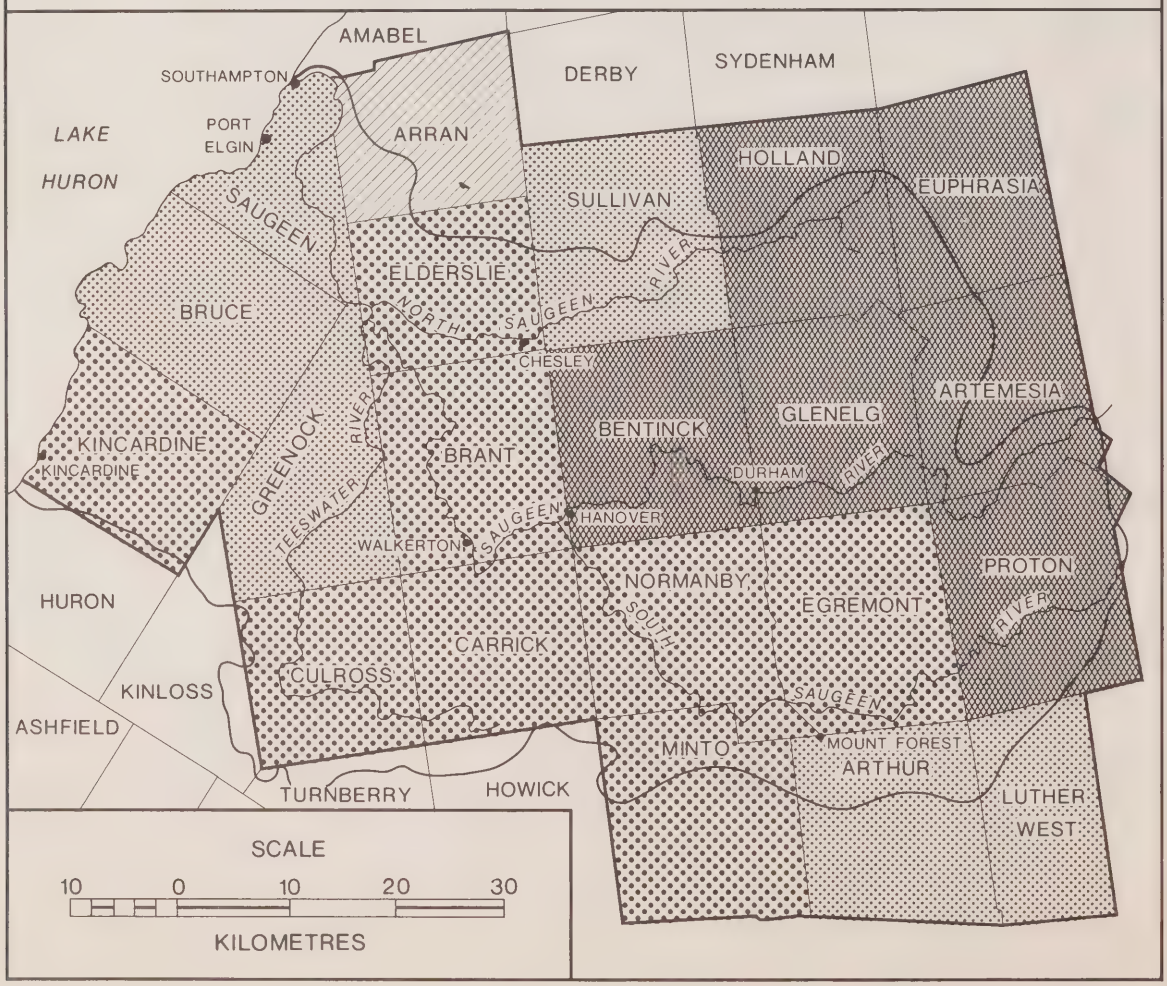


Table 4.11

Change of Total Farm Area by Township--Saugeen Valley, 1966-1976

Township (Census Subdivision)	1966 (ha)	1976 (ha)	Net Change 1966-1976 (ha)	Percent Change 1966-1976 (%)
Bruce				
Arran	21,191	21,471	+ 280	+ 1.3
Brant	27,418	26,921	- 497	- 1.8
Bruce	21,723	19,904	- 1,819	- 8.4
Carrick	23,771	22,857	- 914	- 3.8
Culross	20,966	20,180	- 786	- 3.7
Elddrslie	23,343	22,855	- 488	- 2.1
Greenock	21,559	19,175	- 2,384	-11.0
Kincardine	22,349	22,088	- 261	- 1.2
Saugeen	13,939	12,145	- 1,794	-12.9
	196,259	187,596		
Grey				
Artemesia	21,708	16,846	- 4,862	-22.4
Bentinck	25,526	18,865	- 6,661	-26.1
Egremont	26,530	25,535	- 995	- 3.8
Euphrasia	24,381	19,990	- 4,391	-18.0
Glenelg	17,540	14,403	- 3,138	-17.9
Holland	19,542	15,617	- 3,925	-20.1
Normanby	25,580	25,500	- 80	-0.3
Proton	28,486	22,991	- 5,495	-19.3
Sullivan	26,577	23,886	- 2,691	-10.1
Wellington				
Arthur	25,315	22,884	- 2,431	- 9.6
Luther West	17,629	15,162	- 2,467	-13.9
Minto	26,374	25,300	- 1,074	- 4.1
TOTAL	481,448	434,575	-46,873	- 9.7

SOURCE: Census of Agriculture, unpublished data.

Table 4.12

Land Use (1976) by CLI Agricultural Capability - Saugeen Valley

Land Use 1976	Agricultural Capability Class (in hectares)									
	1	2	3	4	5	6	7	Organic	Unclassed	Total
Orchard	51.8	12.5	0	1.2	17.8	0	0	17.4	0	100.7
Crops & Pasture	168,033.9	45,550.2	26,552.4	1,609.5	43,859.4	14,707.6	345.6	11,257.9	73.7	311,990.2
Scrub	8,265.6	3,300.3	4,796.9	563.7	5,818.8	2,943.4	56.3	7,416.9	0	33,161.9
Forest	22,683.8	10,801.4	9,864.9	1,259.4	14,751.3	3,500.3	418.9	24,664.4	0	87,944.4
Recreation	469.9	669.4	161.5	1.0	65.2	58.7	827.2	320.5	1.6	2,575.0
Urban and Trailer Park	801.7	418.8	279.6	7.3	204.8	147.7	8.1	27.5	11.7	1,907.2
Extractive	316.1	109.7	154.6	22.7	339.5	287.7	61.5	107.2	1.0	1,400.0
Bruce Nuclear Generating Station	0	114.5	11.0	0	0	0	210.8	493.9	0	830.2
Other	44.9	23.5	8.1	0	21.0	5.7	3.2	2.4	0	108.8
TOTAL	200,667.7	61,000.3	41,829.0	3,464.8	65,077.8	21,651.1	1,931.6	44,308.1	88.0	440,018.4

SOURCE: CLDS/Canada Land Inventory/Coleman, 1977.

Table 4.12 shows the 1976 land use of different agricultural capabilities within the study area. A distinct trend towards agricultural use of the best agricultural lands in the region is apparent in the land-use pattern. Table 4.13 shows the quality of the land gained by and lost from agriculture in the period 1966-1976. The higher capability classes, along with organic soils, show net gains; the lower classes show net losses. The result is a small, though significant, trend towards a smaller quantity but better quality of land in agriculture. Nevertheless, much good quality agricultural land in the Saugeen has also changed to other uses.

The trends towards consolidation of farm holdings, filling in of unused land among farms, and using better land for agriculture have as their counterpoint the establishment of forestry on lands of lower agricultural capability. The map of forestry gains and losses has not been reproduced here because it resembles so closely the reverse of losses and gains from agriculture (Figures 4.6 and 4.7). Table 4.14 clearly reveals an abandonment of forestry on classes 1 and 2 agricultural soils and forest establishment, either planned or through abandonment to scrub, on agricultural classes 3 to 6. Note the loss of forestry, however, on land of agricultural class 7, which has extremely low forest as well as agricultural potential.

Further review of the information on land-use change in the Saugeen indicates that much of the development of industrial and urban uses has been at the expense of good quality agricultural land. Forty percent of the land that was built on (urban, trailer parks, transport) during the 1966-76 period was class 1 agricultural land and 80% had cropping potential (classes 1-3). Most of the land used for extraction or recreation also involved land with cropping potential. While small in overall amount, the permanent loss of good quality land to urban and infrastructural uses therefore occurs at the expense of some of the best agricultural land of the valley.

What the Maps and Census Tell Us

In the previous sections of this chapter, changes evident from the census figures and the land-use maps were documented. The two data sources present two different perspectives of the same phenomenon. The census reveals changes in the nature and extent of farming activities and farming use of the land resource. The land-use maps show changes in land-use activities (e.g., recreation, Bruce Nuclear) and cover (e.g., scrub, forest, pasture). The census indicates that Saugeen farmland stock was depleted of 46,951 hectares

Table 4.13

Quality of Land Lost and Gained From Agriculture--Saugeen Valley, 1966-1976

	CLI Agricultural Capability Class (in hectares)									
	1	2	3	4	5	6	7	Built-Up	Organic	Total
Gain	9,853.2	3,963.9	2,705.3	333.5	3,884.9	1,643.2	56.7	3.2	3,349.5	25,793.2
Loss	9,682.7	3,623.7	3,696.4	262.1	4,984.2	1,983.5	100.6	9.9	3,047.5	27,390.6
Net	+170.5	+340.2	-991.1	+71.4	-1,099.3	-340.3	-44.1	-6.7	+302.0	-1,597.4

SOURCE: CLDS.

Table 4.14

Quality of Land Lost and Gained From Forestry--Saugeen Valley, 1966-1976

	CLI Agricultural Capability Class (in hectares)									
	1	2	3	4	5	6	7	Built-Up	Organic	Total
Gain	9,120.7	3,332.9	3,497.9	255.2	4,784.8	1,779.6	59.5	-	3,391.8	26,222.8
Loss	9,808.3	4,408.0	2,604.5	339.0	3,780.0	1,620.0	664.7	2.0	3,911.4	27,137.9
Net	-687.5	-1,075.1	+893.4	-83.8	+1,004.8	+159.6	-605.2	-2.0	-519.6	-915.1

SOURCE: CLDS.

in the 10-year period from 1966 to 1976, while map analysis for the same period shows a net disappearance of only 1,597.4 hectares of land seemingly in agricultural uses. What are the reasons for this apparent discrepancy?

1) Agricultural type of cover does not necessarily mean that the land is farmed. Land that appears from air photos or field observation to be cleared for agricultural purposes may in fact be in use as recreational properties, investment holdings, or hobby farms. The questionnaire has shown an increase in these forms of activities in the region.

2) There is a substantial time delay between the abandonment of land from active agriculture and the change in its appearance to the point where the cover has become clearly non-agricultural. In the Saugeen, most of the land lost from census farms has only recently left agriculture (Table 4.3). The regrowth of scrub cover will in many cases probably be insufficient to preclude the classification of such land as agricultural.

3) Land uses in rural areas lie on a continuum from active cropping and improved pasture through to scrubland and forest. With neglect, former farmland will eventually revert to scrub and forest, though the limits of this classification (i.e., when unimproved pasture becomes scrub) are not clearly circumscribed. Most of the land removed

A decaying barn on the Saugeen River.
J.D. McCuaig

A stone fence on a Saugeen farm.
J.D. McCuaig

from agriculture in the northeast of the Saugeen has reverted far enough to be classed as scrub. It should be noted, however, that because improved agricultural land is easily discerned, the map analysis of the amount of improved agricultural land corresponds more closely with census figures.

The census and map data sources, along with the clarification provided by the questionnaire results, present a good picture of changes in land use in the Saugeen Valley study area. The observed changes include a gradual loss of land from census farms along with increasingly more of the land in farms being improved. By 1976, 76% of land in farms was improved. Land abandoned from agriculture went primarily to forestry or to scrub and was generally poorer in quality and consisted of many small fragmented parcels. Accompanying land abandonment was a concentration of agricultural production on areas with better agricultural capability and infilling of agriculture in areas where agriculture was already prosperous. Gradual change in land cover in the region therefore reflects changes in farming practice.

Taken together, the census and map sources give a picture of a slightly declining land base comprised of significant shifts in the location of land uses within the region. The census provides the net result and can be related to the national and heartland context; the maps help determine the components of these net changes. The data so far have identified how much and where agricultural land-use change has occurred. What remains to be answered is how and why the changes took place.

Deep snow on a Saugeen Valley farm.
J.D. McCuaig

The trains no longer stop in Ruthven, Essex County, Ontario.
E.W. Manning

Chapter Five

FACTORS INFLUENCING RURAL CHANGE IN THE HEARTLAND: THE CASE OF THE SAUGEEN VALLEY

What has caused the land-use changes observed in rural Canada? Alterations in land use have been the result of accumulated responses by landowners and users to the economics of land supply and demand, the economics of farming, and the potential for other land-use activities. Attitudinal changes within Canadian society also affect the response of individual landowners. The various external and internal factors contributing to change have been reinforced or redirected by the involvement of various levels of government in regulatory activities, financial support, and public works.

This chapter will focus on the numerous external factors with an impact on the rural economy of the Saugeen Valley. Through the decisions of the individual landowner, various external factors can result in changes in the ownership and use of land. This chapter will analyse the process by which these factors influence changing land-use patterns through the accumulation of individual decisions.

The literature on rural development and land-use change suggests that a wide variety of factors affect the use of the rural land resource. For the purposes of this paper, these factors have been grouped into seven categories, presented here in the sequence they are analysed in the remainder of this chapter:

1) rising demands for the land resource;
2) changing economics of agricultural production;
3) technological and management advances in farming;
4) changing labour supply;
5) the urbanization of rural attitudes;
6) the influx of urbanites;
7) government programs and regulations.

The relative importance of these factors in causing land-use change and in affecting the economy and society of the Saugeen Valley is discussed below. Through the context of the Saugeen, it will also be possible to put in perspective the large-scale forces influencing rural land use in Canada.

Rising Demands for the Land Resource

Land is a scarce resource; its price depends on the demands placed on it. Land prices rising over the rate of inflation are *prima facie* evidence for increasing land demands relative to the supply of land for farming and non-farm uses. From 1961 to 1976, the value of farmland in Canada rose 417% (Manning and McCuaig, 1979, 16). Many researchers have suggested that the price of farmland as a commodity (potential investment or speculative value) has a significant impact on its use and potential uses and consequently is an important factor in influencing land-use change (Alonso, 1964; Barlowe, 1972; Boal, 1970; Clawson, 1971; Frankena and Scheffman, 1980; Harvey and Clarke, 1975; Lithwick and Paquet, 1968; McCuaig, 1976; Pennance, 1974; Schmid, 1968).

The Saugeen Valley can be characterized as a relatively stable rural environment. Nevertheless, from 1961 to 1976, the average value of farmland escalated by 522% (see Table 4.1), a rate in excess of the Canadian average for land-price inflation and more than five times that of the general inflationary spiral (the Consumer Price Index increase for 1961-1976 was 98.5%). This escalation in value is in itself evidence of increased demand for agricultural land in this area of the Canadian agricultural heartland.

Land Market Activity

Thirty-six percent of the Saugeen questionnaire respondents indicated that they had participated in land-market activity since 1971. This market activity was divided into two types: 1) the acquisition of land for farming purposes; 2) the aquisition of property for non-farm activities. Most of the reported market activity related to the acquisition of additional farmland to augment existing farm properties. One in six of those interviewed had purchased farm property since 1971 and the properties purchased were generally in the 40-80 hectare category, a reflection of the original survey lot size (100 acre units). A further 10% of existing resi-


An old wooden fence in central Ontario.
E.W. Manning

Mixed farms are found throughout the Ontario heartland.
E.W. Manning

dents had sold property during this same period; others had sold out entirely. In addition to purchases, 28% of those interviewed were leasing-in land in order to enlarge farm properties. All of the leased properties were larger than 6 hectares, with 57% of the properties in lease-hold falling into the 40-80 hectare size group.

Non-farm Demands

The purchase or leasing of properties for non-farm purposes in the Saugeen Valley were less important than transactions relating to farming. Only 8% of respondents had acquired holdings for non-farm purposes during the study period, and no surveyed landowners were involved with leasing property for recreation/cottage, residence, commerical, or other non-farm activities. Since the survey included only properties greater than 0.8 hectares and many of the smaller properties used for non-farm purposes were not sampled, this figure could underestimate non-farm uses.

Non-farm demands for land are clearly of some importance in the region. Despite the small number of non-farm units encountered, realtors in the Saugeen Valley indicated that there was a rapidly rising demand for smaller non-farm or hobby-farm (less than 12 hectares) properties. There is a ready market for smaller holdings, originating from as far away as London, Toronto, and Kitchener and sufficient to consume all the smaller properties coming into the market within the valley. Five percent of questionnaire respondents indicated that their properties were hobby farms and a further 2% classified their properties for recreation or cottage use. These figures probably underestimate again the proportion of properties held for recreational or other non-farming purposes because of the size of properties surveyed.

Even among self-designated commercial farmers, 46% listed the most important reason for owning their property as one other than livelihood: 16% believed the most important reason for owning their farm was lifestyle, 15% used their farm primarily for

residence/shelter, 8% wanted their farm for retirement, and 7% were keeping their farm for investment purposes. The fact that livelihood was not the most important reason for owning a farm is indicative of changing attitudes towards rural property. Nevertheless, 54% of the respondents still regard livelihood as the principle reason for owning land.

Farmland Demands

The value of agricultural land used for farming depends on the expected income from farming operations, so rising farmland values in the Saugeen suggests the expectation of greater farming incomes in the valley. From 1961 to 1971 (1976 data unavailable), the value of farm production per hectare in the Saugeen Valley increased 207%, substantially exceeding the general rate of inflation (98.5% according to the Consumer Price Index, Statistics Canada, 1980b). Bray (1979) estimated, through use of an econometric model, that 85% of the increase in Ontario rural land values (1971-76) was due to farm demands whereas only 15% was due to non-farm demand. Through improved agricultural methods, new technology, and superior management, farmers expect and so far have obtained significantly greater returns to the use of land for farming; they have had to.

The opportunity cost of their growing capital investment and operating costs have made it necessary for farmers to earn a greater return from their land. The success of some farmers, whether through farm sales or land sales, raises the expectations of others. By becoming a model, the successful farmer may affect the level of profitability anticipated by other farmers in the area. Thus, the value of all the land in the valley may reflect, to some extent, the potential economic rent accruing from the best management and the best mixture of land, labour and capital. To realize the potential, however, requires major investments in the

The Cost of Land to Farmers

Land values have increased rapidly over the past few years. Data on farmer to farmer sales from the Assessment Branch, Ontario Ministry of Revenue, indicate that land in Essex County selling for around $2,347 per hectare in 1976 was selling for around $6,180 in 1979. This is an increase of $3,833, or 163% in just three years. These increases along with increasing petroleum, fertilizer, and machinery costs are causing great concern in the agricultural industry, because current farm commodity prices have been insufficient to cover the costs of production.

If a farmer financed 75% of his land purchase with FCC at the current 14% interest rate, he would have an interest charge of nearly $650 per hectare in the first year. This cost alone is more than the average gross margin he could generate from producing corn. Or, looking at it another way, amortizing the entire land cost of $6,180 at 12% over 30 years, it would require the net returns from an additional two hectares of land (based on 1980 costs and prices) to pay for the purchase of one hectare of land. Many participants in the agricultural community, including farmers who do not have a land base large enough to generate the cash flow required to support their land purchases, would-be farmers with no land base, and farm organizations interested in maximizing farmers' incomes, support the use of full market values in cost of production determination and subsequent commodity price discussions. By implication, they are saying that agricultural income from selling the produce from one hectare of land should support the purchase of that one hectare.

Escalating land prices have likewise created problems with the method of handling land costs in calculating enterprise costs of production. Some insist that farmers would not be buying land if the costs were really as high as shown in the cost data. Based on the premise that farmers are rational decision-makers, and the fact that they do continue to buy land at current land and commodity prices, it follows that there are factors other than income from agricultural production involved in land pricing decisions.

Derived from Framst, 1981.

A new recreation property in the Saugeen Valley.
J.D. McCuaig

form of expansion, mechanization, or intensification. For those unable to compete, withdrawal from farming may be the only option.

Non-farm demands augment farm demands for rural property within the region, albeit primarily for smaller property sizes. There has been an increase in both farm and non-farm demand, while the supply of land available remains relatively constant. The supply of suitably-sized small properties for recreation, hobby farms, etc., has not kept up with demand. Consequently, there has been a continual sellers' market, particularly for smaller properties; the obvious pay-off for subdivision or fragmentation, wherever possible, can therefore benefit those who wish to or must withdraw from farming.

Despite some regional and local land-use regulation, the questionnaire responses show an acceleration in subdivision and severance in the early 1970s. In the 10 years prior to 1971, only 6% of the properties had subdivided, whereas in the five years after 1971 over 7% were involved in this activity. Severances for housing purposes also increased substantially (7% and 11% for the two periods respectively).

Urban-related and other non-farm demands combined with farm demands for land within the valley stimulate the expectation of even higher land values. The eventual asking price for land may well be related not only to the perceived best farming potential but also to the anticipated opportunity to sell for other activities. One in five questionnaire respondents indicated they were currently interested in the possible sale of all or part of their property.

Rising land demands have been one of the major factors in persuading the farmer to comtemplate changing the amount of his land and intensifying his use of it. Increasing land values make change necessary, just to maintain living standards. The ability and willingness of farmers to make major investments are the key: those who can invest further will grow, while those who cannot must seek other options. Non-farm land demands

make sale (particularly of poorer lands) an attractive alternative. Leasing land to those who wish to expand is another logical solution (Harker, 1975). However, the same rising land prices are making expansion more difficult as a strategy, no matter how necessary it may be to ensure continuing viability.

Economics of Agricultural Production

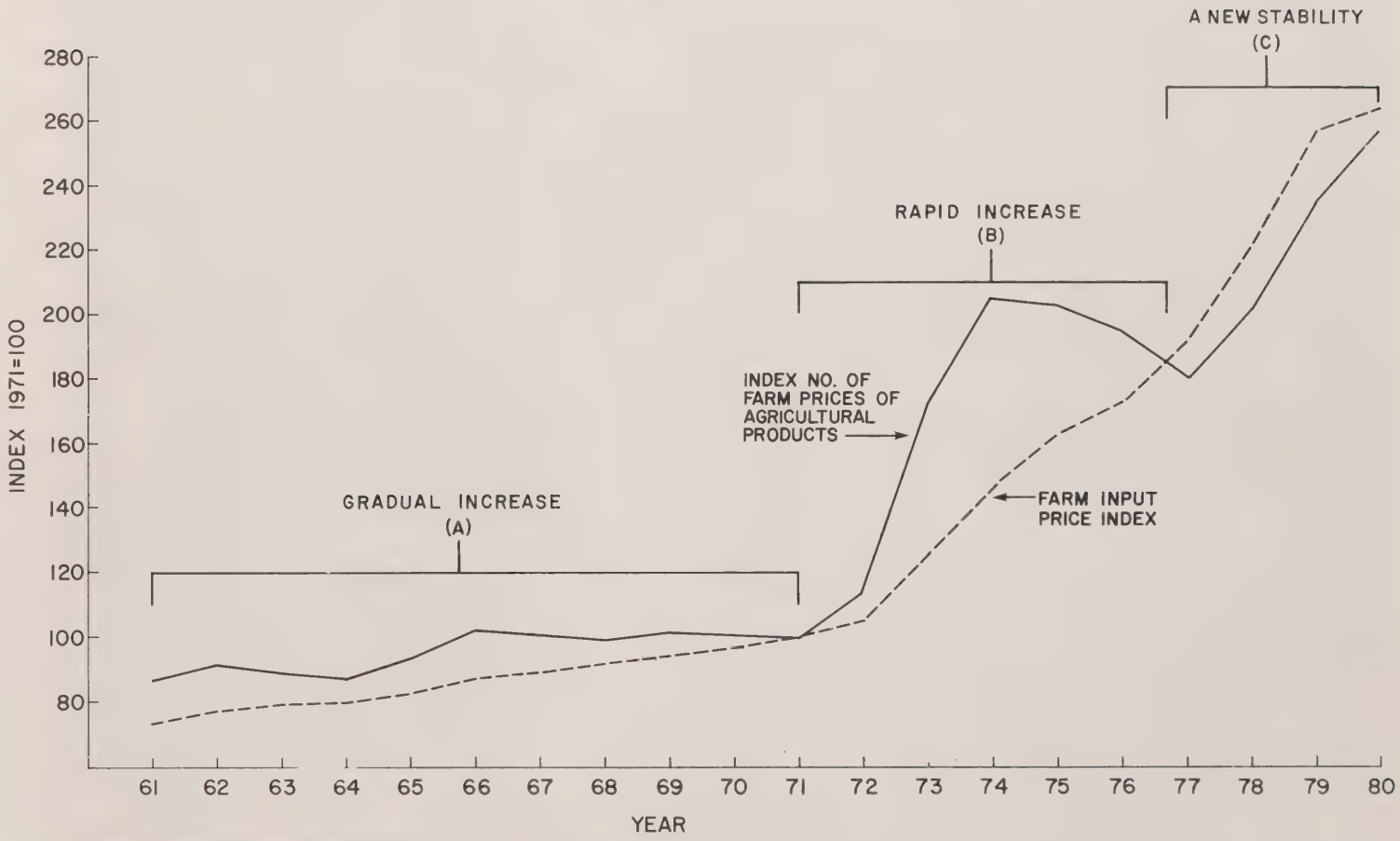
Of all the external factors influencing farmers, changing economics of production were the most significant according to a majority of the Saugeen farmers interviewed. The rising cost of such farm inputs as fertilizers, labour, or additional land, and a declining relative per unit return for farm produce all contribute to what farmers perceive as the cost/price squeeze. The response is therefore to get bigger, get more intensive, or get out.

Figure 5.1 and Table 5.1 illustrate the rates of change in the national indices of farm input costs and farm prices. The different rates of increase between the two indices reveal periods of increasing and decreasing profit for farming in general. Three periods can be discerned from this index. Period A, from 1961 to the base year 1971, is one of gradually increasing costs and prices, with input prices rising slightly more quickly than the sale price of farm products. Period B, from 1972 to 1977, saw rapid changes in prices and farm costs; in spite of price instability, it was also a period of relatively good returns. The data for Period C, from 1977 on, indicate a stabilizing relationship between prices and costs, though both were rising together at a more rapid rate.

Table 5.1 also illustrates the relationship between farm costs, food and consumer prices, and farm production; the rate of increase in farm input costs, including land, rose more quickly than the general inflation rate (CPI). Farm prices also rose in response, though unevenly. The rise in the food component of the CPI shows the result for consumers of these trends.

Mennonite farmers are one market for good farmland in the Saugeen Valley.
E.W. Manning

FIGURE 5.1
RELATIONSHIP OF FARM INPUTS TO FARM PRICES
-CANADA
1961-1980



Source: Statistics Canada 1980c, 1980d

Table 5.1

Trends in Farm Costs and Incomes - 1961-1980 - Canada

	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Farm Input Price Index (1) (1971 = 100)	73.5	77.3	79.4	79.8	82.3	87.1	89.3	91.8	94.9	96.5	100.0	105.9	126.5	147.5	162.4	172.8	180.0	201.1	234.4	257.2
Index No. of Farm Prices of Agr. Products (1) (1971 = 100)	87.0	90.7	89.5	88.1	93.8	101.8	100.9	99.2	101.6	100.9	100.0	114.0	170.4	205.5	203.6	195.1	191.7	220.5	256.3	263.9
Consumer Price Index (1971 = 100)	75.0	75.8	77.2	78.6	80.5	83.5	86.5	90.0	94.1	97.2	100.0	104.8	112.7	125.0	138.5	148.9	160.8	175.2	191.2	210.6
Index of Farm Production (1) (1971 = 100)	64.9	81.3	89.2	83.3	85.0	98.6	85.3	92.1	95.9	88.6	100.0	95.3	98.0	92.6	102.9	112.0	111.5	114.7	N/A	N/A
Food Price Index	76.1	77.5	80.0	81.3	83.4	88.7	89.9	92.8	96.7	98.9	100.0	107.6	123.3	143.4	161.9	166.2	180.1	208.0	235.4	260.6
Ratio Farm Input / Farm Price	1.18	1.17	1.12	1.10	1.13	1.17	1.13	1.08	1.07	1.05	1.00	1.08	1.35	1.39	1.25	1.13	1.07	1.10	1.09	1.03
	←					← SAUGEEN STUDY PERIOD				NATIONAL STUDY PERIOD →										

(1) Excludes Newfoundland
N/A = Not available.

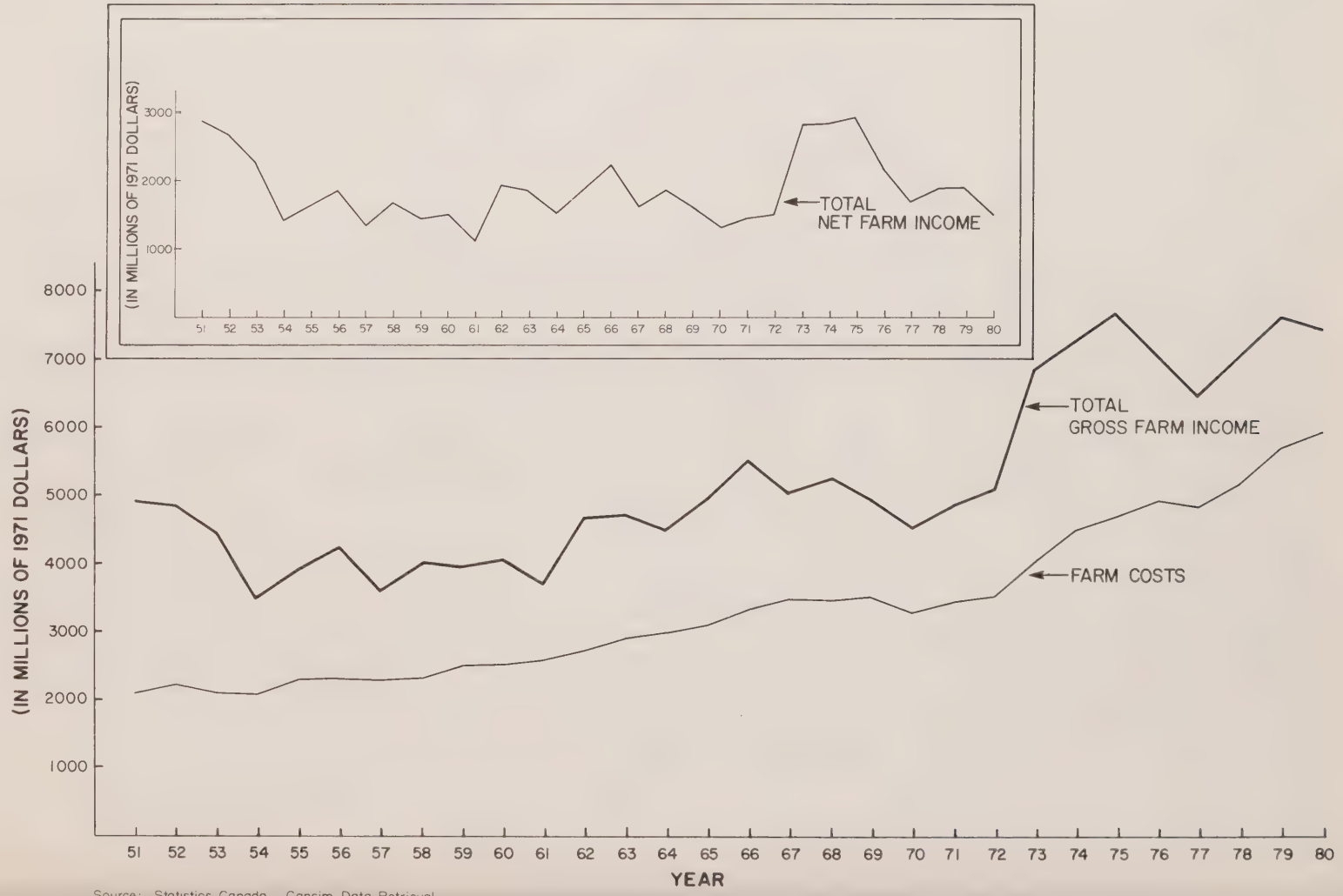
SOURCES: Statistics Canada, Catalogue 62-004, Farm Price Index measures price movements of commodities and services used in Canadian farming (for a more detailed explanation see Statistics Canada, 1980 c).

Statistics Canada, Catalogue 21-203, Index of Farm Production measures the physical volume of agricultural production including commodities produced on farms for sale, consumption in farm homes, or additions to farm inventories (for further explanation including variability of commodity content see Statistics Canada, 1976 a).

Statistics Canada, Catalogue 62-003, Index Numbers of Farm Prices of Agricultural Products is an overall index of prices received by farmers from the sale of farm products (see Statistics Canada, 1980 d).

Statistics Canada, Catalogue 62-001, The Consumer Price Index measures the percentage change through time in the cost of purchasing a constant "basket" of goods and services representing the purchases by a particular population in a specified time period (see Statistics Canada, 1980 b. Also includes the Food Price Index -- a component of the CPI).

FIGURE 5.2
TRENDS IN NATIONAL FARM COSTS AND INCOMES 1951-1980
IN CONSTANT 1971 DOLLARS



Source: Statistics Canada. Cansim Data Retrieval

Table 5.2

Total Gross and Net Farm Income--Canada, 1951-1980

Year	Total Gross Farm Income ($ millions)		Total Net Farm Income ($ millions)		Difference Between Adjusted Gross and Net Farm Income =/or Farm Costs ($ millions 1971)
	Actual Actual ($ millions)	Adjusted to Constant Dollars ($ millions 1971)	Actual ($ millions)	Adjusted to Constant Dollars ($ millions 1971)	
1951	3,283	4,974	1,905	2,886	2,088
1956	2,893	4,223	1,268	1,851	2,372
1961	2,790	3,720	841	1,121	2,599
1966	4,613	5,525	1,841	2,205	3,320
1971	4,837	4,837	1,423	1,423	3,414
1976	10,556	7,089	3,259	2,189	4,900
1980	15,619	7,416	3,039	1,443	5,973

SOURCE: Statistics Canada. Cansim Data Retrieval: Consumer Price Index for Canada, 1971 = 100, Annual Averages; Income of Farm Operators from Farming Operations, for Canada, Annual.

The consequences for farm income and costs of these trends are best shown in constant gross and net farm income dollars. Table 5.2 and Figure 5.2 demonstrate graphically the changing purchasing power of farming returns as expressed in constant 1971 dollars. These figures confirm that the total amount of real income received by Canadian farmers as a group has declined. The period when real income was lowest coincides with the period of greatest farmland loss (1966-1971). After 1971, increased purchasing power coincides with a period of slower farmland loss, of farmland recovery in some areas, and of gains in improved land. What has happened over the 30 years measured is that the real size of national farm income has slightly declined, though the expectations of farmers have continued to grow in concert with the living standards being realized by other Canadians. Farmers are now less able to earn enough for a rising minimum acceptable standard-of-living. That this has occurred is demonstrated by the decreasing number of farmers documented in Chapter Two. Farmers can keep up with others only if there are fewer sharing the profits from the use of the farmland resource. At the farm level, desired living standards have been maintained only through increased efficiency and growth, entailing heavy capitalization and high debt loads. Throughout the 1970s, costs for key items rose more rapidly than receipts. From 1971 to 1980, total operating expenses for all farms rose 364%, while receipts increased only 344%. Fertilizer and interest costs increased the most, at 612% and 595% respectively (Statistics Canada, 1981b).

Tables 5.3 and 5.4 show the per unit value for livestock and key crops produced in the Saugeen Valley; here, the per unit product farming returns have remained constant or declined over time, with the sharpest declines occurring in the 1966-1971 period. Figure 5.3 graphically illustrates the large fall in profits (difference

Table 5.3

Value of Products Sold - Saugeen 1951-1971[a]

Value of Product Sold Product	1951 $	1961 $	1966 $	1971 $	1976
Wheat	1,128,329[b]	38,490	127,490	76,570	
Other Grains	*	282,410	700,710	766,150	
Hay & Fodder	355,574[c]	170,220	463,550	296,510	
Potatoes, Roots, etc.	134,932	415,740	638,790	546,350	
Vegetables	7,279	11,320	21,420	140,970	
Tree & Small Fruit	25,046	25,840	69,000	148,190	
Greenhouse & Nursery	36,735	112,210	843,000	7,440	
Cattle & Calves	11,718,297	17,543,800	27,217,480	44,144,610	
Dairy	4,505,768	6,587,020	9,482,670	12,785,080	
Poultry & Eggs	2,714,994	3,953,550	3,282,990	5,676,920	
Turkeys, Ducks & Geese	*	513,610	273,930	564,110	
Swine	7,550,654	8,434,130	12,344,440	14,065,600	
Horses, Sheep & Wool	477,359	366,470	377,030	437,870	
Forest Products	273,627	332,710	162,100	339,260	
Other	183,448	372,800	612,900	937,498	
Total Value of Products Sold	29,112,042	39,160,320	56,617,520	80,933,128	
Adjusted for Consumer Price Index	44,109,155	52,213,760	67,805,413	80,933,128	
Adjusted Value/ha	85.18	105.72	140.59	180.63	

* Data not collected.

[a] 1976 data not available.
[b] All grain 1951.
[c] Hay only 1951.

Source: Statistics Canada, Census of Agriculture, unpublished data and the Consumer Price Index, Catalogue No. 62-001.

Table 5.4

Value of Produce Per Hectare--Saugeen Valley, 1951-1976

Product \ Year	1951 ($/ha)	1961 ($/ha)	1966 ($/ha)	1971 ($/ha)	1976
Wheat	9.44[b]	9.77	35.21	40.34	a
Other Grain	*	2.86	7.50	9.19	a
Hay and Fodder	3.87[c]	1.66	4.08	2.74	a
Potatoes, Roots, etc.	1,115.14	660.95	991.91	e	a
Vegetables	d	95.9	151.92	395.98	a
Tree and Small Fruit	160.00	152.31	423.31	981.39	a

[a] 1976 data for value of product not available
[b] All grain 1951
[c] Hay only 1951
[d] Included with fruit 1951
[e] Not all data available

SOURCE: Statistics Canada, Census of Agriculture, unpublished data.

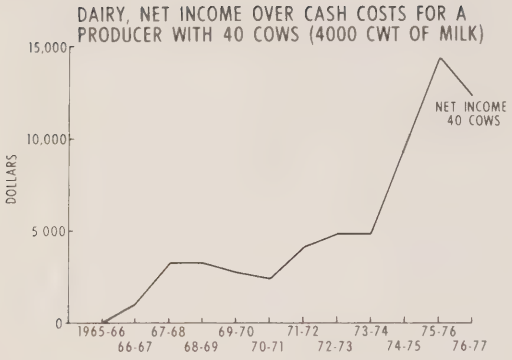
between net income and cash costs) for specific products in the seventies. Each farmer, therefore, had to produce more or increase the efficiency of operation just to remain viable. Thus, the per farm income has risen only through increased scale, increased capitalization, and fewer farms.

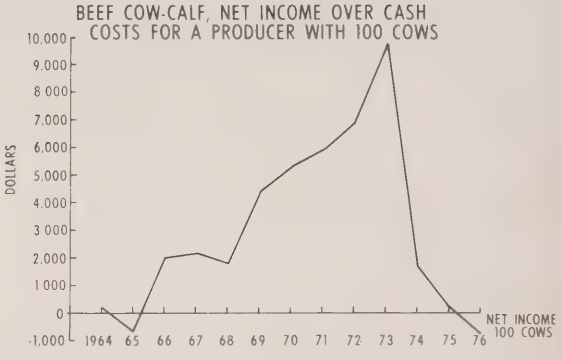
A consequence of the cost/price squeeze is that many farmers have been faced with a situation where their existing farming scale and activity mix have been insufficient to ensure continuing adequate returns. Greater capitalization has been the only alternative for many farmers. Saugeen farmers who wish to remain in farming must: 1) change their crop/activity mix, 2) increase their scale of production, 3) increase the intensity of their land-use activities, 4) change from full-time farming to part-time farming, or 5) combine any of these.

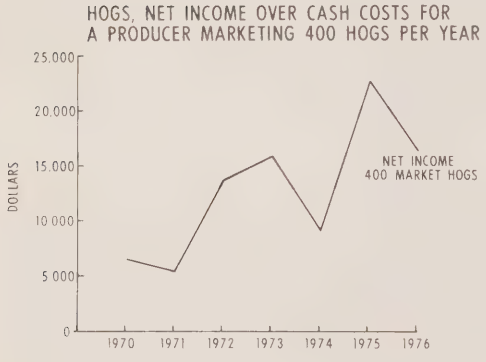
Crop/Activity Mix

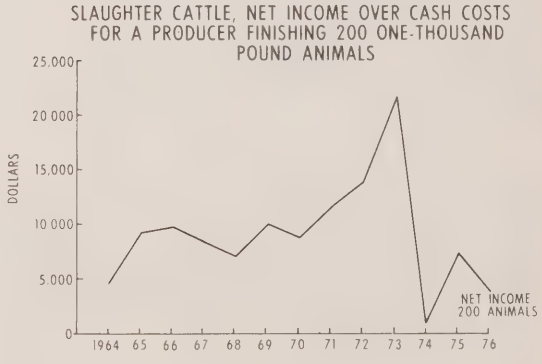
Saugeen farmers were aware of the changing economics of production for key crops and many have taken direct actions in coping with the cost/price squeeze. Thirty percent of the farmers interviewed in the valley intensified or altered their crop mix because of increased operating costs or a relative decrease in the market prices of particular products. The general trend within the region was to change from oats to the cultivation of corn because of the higher returns for corn as fodder. The cultivation of fodder crops was accompanied by a significantly greater emphasis on livestock, particularly beef and dairy cattle, poultry, and swine. All have required an investment in new facilities, machinery, and often more land.

FIGURE 5.3
NET PROFIT*FOR SELECTED PRODUCTS









*NET PROFIT=Net income over cash costs cover any marketing expenses, the depreciation of capital items used in the enterprise and the return on capital and family labor used in the enterprise

SOURCE: TASK FORCE ON THE ORIENTATION OF CANADIAN AGRICULTURE, 1977 VOL. III

Scale of Production

The survey indicated that, during the study period, 17% of Saugeen farmers found it necessary to enlarge their farm base through the purchase of land, while 28% leased-in from other landowners. These farmers made substantial investments altering the scale of their operations just to remain viable in a changing economic environment (see Tables 5.4 and 5.5). From 1966 to 1976, the average farm in the Saugeen grew 8% (23% nationally), though during the same period the number of commercial farms in the valley fell 16% (21% nationally).

The interviews revealed that the cost/price squeeze affected some farmers more than others. In particular, farmers managing beef farms of 40-120 hectares reported the greatest need to change, due at least in part to the instability of the beef market. All farmers have found that their debt load is heavier, a reflection of increasing capital requirements (see Table 5.5). Another factor adding to the cost or debt load of farmers has been rising interest rates. The carrying costs of debt, combined with the vast increases in capital required for entry into farming and the expenses for fixed and operating costs, have exacerbated the cost/price squeeze. In fact, Bruce and Grey county beef farmers have been leaders in the national fight for reduced interest rates for farmers and against farm foreclosures.

Intensification

One of the more significant responses to the changing economics of farming was the intensification of land use. Table 5.6 shows some specific actions undertaken by Saugeen farmers, principally for "economic reasons." The figures show an acceleration of changes made over time, in response to both the economic difficulties from 1966 to 1971 and the better prospects thereafter. New infrastructure (buildings, fences, drainage, ponds, bulk handling, irrigation) was reported on most farms. Fencing removals demonstrate field enlargement and new fencing the addition of some of the better of the remaining unimproved land. Similarly, the planting and removal of woodlots is directed towards the most economic use of land relative to its potential. All of these actions involve capital inputs. In the Saugeen Valley, the levels of investment per hectare, expressed in constant 1971 dollars, rose 155% from 1951 to 1976.

The bottom line for the region has been a tripling of the real value of product per hectare from 1951 to 1971 (see Table 5.3); increasing product value is evidently the result of higher capital inputs into machinery, equipment, and improvements. Thus, the national trend towards larger, more intensively-managed farm units is clearly present at the regional level.

The Specialty Product Strategy

Some farmers have responded to changing conditions by moving to specialty crop production. In the Saugeen, signs advertise Charolais, Black Angus, or Simmental breeding operations. Trout farms, mink ranching, and Christmas trees can be found within the region, and there are small areas devoted to organically grown vegetables for the health food market. Usually, these producers are linked to a special land market, or even to a particular shop or chain in a large city.

Such specialty operations are risky because of their limited markets. While one or two producers may prosper, more would fragment the market and make all operations uneconomical. This type of specialization also carries increased risk of loss through disease, machinery breakdown, and climatic extremes and requires substantial initial investment. Thus, while specialty production can benefit a few, it is not a viable alternative for most.

Table 5.5

Economic Trends--Saugeen Valley, 1951-1976

	1951	1961	1966	1971	1976
Number of Farms	8,358	7,472	6,813	6,080	5,681
Percent of Farms Leasing Land	N/A	12%	N/A	18%	28%
Improved Land (ha)	361,464	356,733	355,942	327,410	330,457
Farmland (ha)	517,776	493,868	482,279	448,038	435,328
Average Farm Size	61.9	66.1	70.8	73.5	76.6
Percent of Farmland Improved	69.8	72.2	73.8	73.1	75.9
Percent of Farmland Leased	N/A	8%	N/A	12%	19%
CAPITALIZATION: ($)					
Value of Machinery	24,700,674	28,613,300	38,763,500	47,393,700	106,444,092
Value of Livestock and Poultry	52,179,242	47,304,600	57,473,600	74,811,150	116,519,268
Value of Land and Buildings	63,344,983	105,158,500	138,507,500	218,151,900	454,339,915
TOTAL CAPITALIZATION	140,224,899	181,076,400	234,744,600	340,356,750	677,303,275
Average Capital Value/Farm	16,777.32	24,233.99	34,455.39	55,979.72	119,222.54

N/A = Not available.

SOURCE: Statistics Canada, Census of Agriculture, unpublished data. Questionnaire.

Table 5.6

Alteration to Land--Saugeen Valley, 1951-1977

ACTIVITY	1951-70 (%)	1971-77 (%)
New farm buildings	21.1[d]	27.8[d]
Fencing of unfenced areas	9.1[c]	13.2[c]
Fence removal	30.0[d]	34.6[e]
Woodlot clearance	4.5[b]	7.3[c]
Woodlot planting	5.1[b]	6.3[c]
Drainage (field, swamp, etc.)	22.7[d]	24.7[d]
Farm pond construction	9.5[c]	6.3[c]
Irrigation system	1.0[a]	0.8[a]
Gravel extraction	4.3[b]	4.9[b]
Bulk handling installation	8.1[c]	12.8[c]
Topsoil removal	-	0.8[a]
Other	0.4	3.3

* Percentages are based on total number of landowners surveyed.

[a] Estimate accurate within 1 percentage point with 95% confidence
[b] Estimate accurate within 2 percentage points with 95% confidence
[c] Estimate accurate within 3 percentage points with 95% confidence
[d] Estimate accurate within 4 percentage points with 95% confidence
[e] Estimate accurate within 5 percentage points with 95% confidence

SOURCE: Questionnaire

Pigs and hogs are important livestock in the Saugeen Valley.
J.D. McCuaig

Part-Time Farming

Other Saugeen farmers reacted to the changing economics of agriculture by altering their work pattern through off-farm employment (see Table 5.7). Both the 1971 and 1976 censuses showed over 40% of Saugeen farm families with off-farm incomes. Part-time farming may be a reaction to the inability or unwillingness of farmers to capitalize sufficiently for intensification or expansion. It should also be noted that part-time farming may be a means of entering full-time farming, as well as of acquiring the capital necessary to achieve a viable scale of operations. It has become clear that "an ever-increasing segment of farm operators pressured by the cost-price squeeze are responding by attempts to supplement their farm income from off-farm sources" (Centre for Resources Development, 1972, 160). In the Saugeen, most smaller farm units were part-time units, allowing additional income earned by family members to supplement farm income. Thus, the concept of the small family farm as typical of the Canadian agricultural heartland may no longer be an accurate reflection of the reality. Saugeen farmers have been faced with a difficult choice—increase the size and efficiency of their farms or withdraw, even if just partially, from farming.

Technological Advances

During the past two decades, a number of technological innovations and crop advances in farming have had nationwide implications (Task Force on the Orientation of Canadian Agriculture, 1977, Vol. I, Part A, 115-116). Some of these advances have found their way to the Saugeen where they have affected farming practices and land use. The survey indicated that approximately 10% of Saugeen landowners felt that specific technical innovations in farming practices over the preceding five years had influenced their land-use activity.

Table 5.7

Trends in Off-Farm Work, Canada and the Saugeen Valley, 1966-1976

	Total Number of Operators	Full-time (under 25 days off-farm work	Part-Time	
			25-156 days off-farm work	Over 156 days off-farm work
CANADA:				
1966	430,522	291,412	69,689	69,421
% of Total		67.7	16.2	16.1
1971	366,128	254,255	46,854	65,019
% of Total		69.4	12.8	17.7
1976*	338,552	234,086	37,294	67,172
% of Total		69.1	11.0	19.8
SAUGEEN VALLEY:				
1966	6,813	4,874	866	1,073
% of Total		71.5	12.7	15.7
1971	6,080	3,954	831	1,295
% of Total		65.0	13.7	21.3
1976	5,681	3,600	667	1,414
% of Total		63.4	11.7	24.8

* Does not include Yukon and Northwest Territories.

SOURCE: Statistics Canada, Census of Agriculture, Unpublished data.

The Phenomenon of Part-time Farming

Nearly 30% of commercial farmers according to the 1976 census farmed part-time—they worked at least 30 days per year off the farm. Farm-oriented part-timers, with under 150 days off-farm work per year (Trant, 1980), comprised 17% of all farmers, while a further 13% of commercial farmers spent more time in off-farm work than on the farm.

Part-timing is the best alternative for those who wish to farm but lack the money, land, or other requisites to earn a satisfactory living from farming alone. Part-timing may be a means of gradually entering farming, allowing new farmers to accumulate over time the necessary capital to become full-time farmers. Others may be satisfied with part-timing as a continuing way-of-life, combining such activities as trucking services, construction work, etc., with farming occupations. For others, part-time farming offers a way out of farming, leading to retirement, urban migration, or non-farm careers.

Bollman (1979) has produced statistics, using a program developed from census data, that demonstrate the process of entry to and exit from farming for the period 1966-1976. The tables show that part-time farming was used as a way into full-time farming. Some farmers also went from full-time to part-time and then back to full-time, with part-timing being a temporary measure. Table 2 indicates that part-timing was both a route in and a route out for many. Only a few (under 20%) remained part-time over the 10-year period.

In some regions, because of a poor or fragmented resource base, part-timing could be the most logical response for those wanting to grow agricultural produce. Their non-farm jobs may help provide the necessary services (repairs, farm equipment, transport) that allow them and others to farm. Part-timing continues to be an important part of the Canadian agricultural community and it can range from those who farm most of the time to those who have other occupations and farm just enough to qualify as commercial farmers.

Table 1

Where Did the 1976 Full-time Farmers(1) Come From?

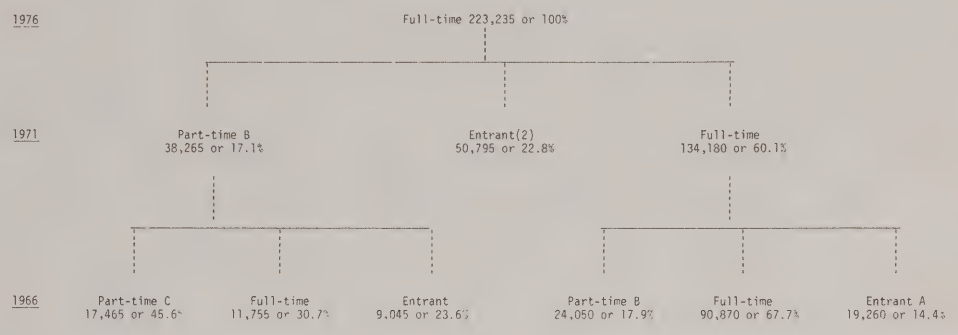
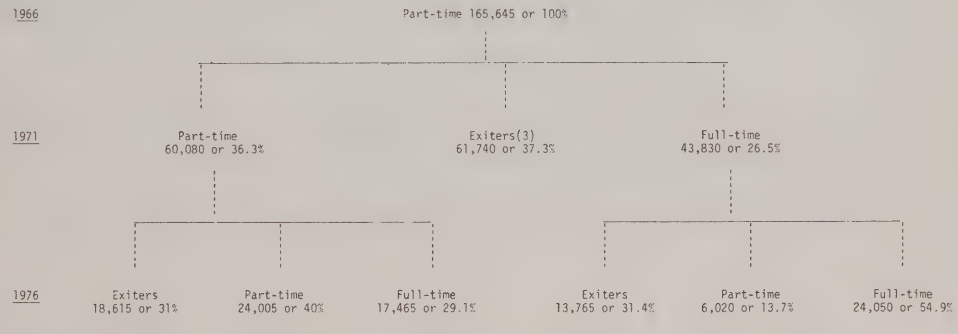


Table 2

What Happened to the 1966 Part-time Farmers?



Source: Bollman, 1979.

(1) A full-time farmer is a census-farm operator who reported no days of off-farm work in the previous year, so a part-time farmer is a census-farm operator with "some days of off-farm work".

N.B. operators of institutional farms are excluded.

(2) An entrant is a census-farm operator who has started farming.

(3) An exiter is a census-farm operator who has stopped farming.

Table 5.8

Mechanization Trends in Canada, 1951-1976

	1951	1961	1966	1971	1976(c)	% Change 1966-76
Forage crop harvesters	(a)	16,764	24,317	28,534	35,101	+44
Motor trucks	196,122	302,012	344,836	369,849	444,390	+29
Tractors	399,686	549,789	598,483	569,698	635,055	+6
Swathers	(a)	96,154	124,216	139,829	153,359	+23
Grain combines	90,500	155,611	170,182	162,751	163,560	-4
Pick-up hay balers	(a)	89,522	136,954	152,832	159,778	+17
Milking machines(b)	70,883	106,119	102,801	80,631	60,807	-41

(a) The census did not record these machines in 1951.
(b) Figures for "milking machines" were tabulated by the number of farms reporting; actual number of machines were tabulated for ther categories.
(c) 1976 figures obtained through User Services Census of Agriculture.

SOURCE: Statistics Canada, Census of Agriculture, unpublished data.

Primary among the innovations cited were the development of forage harvesters and of new seed varieties, principally of corn. A variety of such mechanical advances as new combines, swathers, bulk feeders and bulk-handling facilities were also viewed as important to the increased size and changing type of farm operations (Tables 5.8 and 5.9). These mechanical advances involved larger-scale operations and directly affected the feed grains industry. The significant change in farmland use from oats to corn during the 1966-76 period can be attributed at least in part to the improved machinery and techniques pertinent to corn planting and harvesting.

Scale economics of machinery purchase and use also mean that mechanical advances have contributed to the observed consolidation of farms. The degree of increasing farm mechanization is indicated by census figures on the specific incidence of farm-machinery ownership nationally and in the Saugeen; the national trends in mechanization (Table 5.8) are reflected in the increased use of combines, swathers, and harvesters in the Saugeen (Table 5.9). Mechanization is even more pronounced on a perfarm basis due to the declining number of farm units. However, the census figures do not identify advances in the size, sophistication, and efficiency (not to mention expense) of par-

Table 5.9

Mechanization Trends--Saugeen Valley, 1951-1976

	1951	1961	1966	1971	1976	% Change 1966-76
Number of Farms in Saugeen	8,358	7,472	6,813	6,080	5,681	-16.6
Motor Trucks	1,180	2,642	3,112	3,470	4,131	+33
Number per Farm	.14	.35	.46	.57	.73	
Tractors	5,749	8,663	9,621	10,386	11,303	+17
Number per Farm	.69	1.16	1.41	1.70	1.99	
Grain Combines	352	856	1,608	1,316	1,560	-3
Number per Farm	.04	.11	.24	.22	.27	
Swathers	-	-	477	884	1,275	+167
Number per Farm	-	-	.07	.14	.22	
Hay Balers	-	1,682	2,601	3,076	3,222	+24
Number per Farm	-	.23	.38	.50	.57	
Crop Harvesters	-	583	664	885	1,265	+91
Number per Farm	-	.08	.09	.14	.22	
Milking Machines*	1,645	3,041	4,141	---	---	
Number of Farms Reporting	-	-	-	1,521	1,537	
Bulk Milk Tanks*	-	217	-	-	-	
Number of Farms Reporting	-	-	-	-	807	

* Method of data collection changed, so comparable data not available.

SOURCE: Statistics Canada, Census of Agriculture, unpublished data.

A southern Ontario example of the increasing mechanization of agriculture.
E.W. Manning

ticular pieces of machinery. Table 5.5 shows the amount of investment in mechanization in the Saugeen, where the calculated per farm capitalization in machinery increased 229% from $5,689 in 1966 to $18,737 in 1976. The implications for debt load and carrying costs are obvious.

The development of new sprays and spraying and fertilization techniques may be more important in intensive market gardening regions, though these advances are also found in the Saugeen. New techniques, however, were significant only for a few producers of horticultural crops, with weed sprays noted as particularly important. Along with increased mechanization and bulk handling, new chemical techniques have a direct impact on (or alternatively, can be direct results of) the labour requirement of a given farm unit and may result in the replacement of labour by increased capitalization.

Livestock production has also benefited from such technological advances as zero grazing, feedlots, horizontal silos, and improved supplements. Bulk milk handling and improved milking equipment have significantly affected the scale economies of dairy farming. Poultry has similarly profited from mechanization of feed and handling. All these technological changes, however, require a farmer to become, or hire, a technical and financial manager.

Technological changes are reflected in increasing intensity of land use, larger farm sizes, greater productivity per hectare, and the high level of capitalization in farms and farm machinery. Larger and more expensive machines have promoted larger farm units for scale economies, and adoption of new techniques constitutes an intensification of agriculture and a commitment by Saugeen farmers to specialization in certain crop types. Futhermore, increased mechanization requires land with better soil quality and soil depth and terrain without limitations of slope, rock intrusions, or excessive stoniness or moisture. New techniques have therefore contributed to the gradual shift towards more intensive utilization of the best land for farming and

could further advance the trend towards survival of only the fittest farmers.

Changing Labour Availability

Because the amount and quality of labour affect farm viability, two factors are involved in the changing supply of farm labour: the farm family and the availability of hired help.

Canadian farm families (along with all other families) have been getting smaller. The average Canadian family in 1976 consisted of 3.5 people, down 10% since 1961. In addition, children have become less interested in working on the family farm, farmers are seeking off-farm labour, and the farmer's own ability to meet the heavy labour and greater skill requirements of farming declines with age.

These national trends are borne out in the Saugeen Valley. The size of the average family declined by 10%, from 3.9 in 1961 to 3.5 in 1976, providing a smaller farm-bred labour base. Forty percent of the farmers responding to the Saugeen survey indicated that their property had no prospect of remaining in the hands of a son, daughter, or other relative who could take over upon the retirement of the farmer. Consequently, many properties have come on the market for sale to new or expanding farmers, or to other users of land. Even those farmers who had family helping in some way (51%) could not count on family succession. Only 10% of farmers interviewed had resident working sons or daughters, mostly as paid or semi-paid labour. The survey indicated that, in the long-term, nearly 60% of those interviewed *hoped* that their property would remain in the family. The demographic statistics and economic problems associated with transferring farm ownership within the family, however, do not support that percentage of farms being passed on from generation to generation. Nevertheless, with enrolments rising in agricultural colleges and with most of the students coming from farm backgrounds (Leuty, *et al.*, 1980), there is some indication that many farms will remain in families.

Not only are sons and daughters leaving the farm, but those who stay are less likely to work there. It is often more profitable for spouses and children to work in non-farm occupations. Forty percent of Saugeen farmers indicated that their spouse or resident children worked off the farm in occupations ranging from machinery, construction, forestry, or transport industries to processing and clerical work. Together with the 25% of farmers involved in off-farm work themselves (principally in transport, forestry, or machinery), an average of 37% of family income for these families came from off-farm work. According to their owners, 41% of Saugeen farms were worked on a part-time basis in 1976. This often led to less intensive land use on these properties than might otherwise be the case on a full-time farm.

Harvesting most field crops has been at least partly mechanized.
Julien LeBourdais, NFB Phototheque

According to the 1976 census, 31% of Canadian farm operators (farms over $1,200 product) were over 54 years of age, yet only 10% of the national labour force was over 54. Ten percent of Canadian farmers were over 65 compared to only 2% of the total labour force. The Saugeen farm population paralleled the national figures, with 32% over 54 and 12% over 65.

The data in Table 5.10 show an aging Saugeen farm population, with perhaps a reduced ability to provide labour to the farm enterprise. Statistics Canada revealed that the average farmer in the Saugeen in 1976 was about 50 years old, and the questionnaire found that the largest number of farmers were between 40 to 59 years of age. Less than 1% of farmers were younger than 30 and more than 20% were older than 60. The census confirms these figures, showing 21%

of the farmers to be over the age of 60 (Table 5.10). The aging farm population is a continuing problem, leading to less labour for the farm and less labour-intensive land use.

Non-family labour has also become increasingly more difficult to obtain because of the migration of the young to urban jobs and to school, the increased competition from non-farm work, and the physically difficult, unattractive, and low-paying nature of farm work (as perceived by many rural and urban people despite the increasing technical sophistication of much farm work). Government social programs such as unemployment insurance and minimum-wage provisions have perhaps reinforced this trend.

In the Saugeen Valley, 24% of the surveyed landowners experienced problems in obtaining adequately-trained farm labour. The principal complaints of farmers related to obtaining skilled labour, notably skilled machinery operators, milkers, and full or part-time hired help. Shortages of unskilled seasonal labour for such duties as haying and harvesting of field crops were also mentioned, though these were not viewed as critical for the type of farming within the region. Most of those reporting labour problems were in the 40-120 hectare farm category and were predominantly single-operator units. Larger farms generally were able to obtain satisfactory levels of permanent labour, while smaller farms tended to have fewer labour problems than the medium-sized farms simply because they required less outside labour.

One factor contributing to the farm-labour shortage has been the inability of farmers to compete, both financially and in terms of working conditions and fringe benefits, with large-scale, non-farm businesses. This is particularly true of the construction industry which can pay much higher wages for both skilled and unskilled labour. In the case of the Saugeen, large-scale construction activity at the nearby Bruce Generating Station has had a significant impact both on the labour supply and on the pay expectations of local labourers. This problem has been reportedly greatest

Mechanization cannot completely replace farm labour.
Julien LeBourdais, NFB Phototheque

Table 5.10

Age of Operator--Saugeen Valley, 1961-1976

Age \ Year	1961	1966	1971	1976
Under 25	181	153	125	155
25-34	1,023	951	805	920
35-44	1,734	1,487	1,407	1,294
45-54	1,933	1,817	1,636	1,477
55-59	894	836	729	630
60-64	756	692	608	502
65-69	477	475	414	330
70+	474	402	356	373
TOTAL	7,472	6,813	6,080	5,681
% under 34	16.1	16.2	15.3	18.9
% over 54	34.8	35.3	34.7	32.3
% over 64	12.7	12.9	12.7	12.4

SOURCE: Census of Agriculture, unpublished data.

in those townships nearest to the Bruce Generating Station, though the impact declines with distance from this employment centre.

Most Saugeen farmers were prepared to pay good wages for good work. The minimum wage was considered too high for the quality of labour the farmers were able to attract, but for trained and diligent labour they were often prepared to pay significantly higher, if not industrial level, wages.

Labour shortages affect land use in the valley principally through choice of crop, size of enterprise, or type of tenure. Larger and more mechanized field crop units are evidence of this land-use impact in the Saugeen, with farmers choosing to replace scarce and/or expensive labour with capital. The trend towards corn and mechanized haying operations also requires larger units to justify mechanization and carry debt loads, and increased land leasing is one means of achieving the needed scale of farming. Another response is the growth of "pick your own" operations for market gardening—an imaginative way to solve the labour problem. Similarly, the trend towards less intensive use of land on smaller or part-time units is due at least in part to labour and cost problems.

The Urbanization of Rural Attitudes

Rural Canadians have become increasingly more urbanized; that is, they have been absorbed into the mainstream of urban Canadian culture. In 1951, the Saugeen Valley was predominantly an agricultural area where there were clear distinctions, both materially and socially, between this rural region and urban Canada. Table 5.11 is a statistical comparison between the Saugeen Valley and urban Canada in 1971, showing similar quantities of such items as television sets, automobiles, and bath tubs per family. The only significant differences were between numbers of freezers and automobiles. There will no doubt be fewer differences when the 1981 information becomes available.

These data on consumer goods are evidence of how lifestyles in rural Saugeen and urban Canada have converged through improved communications and transportation. In effect, the rural lifestyle and rural people within the region have been urbanized. Studies (e.g., Ricour-Singh, 1981) have shown that while substantial differences between rural and urban opinions, aspirations, lifestyles, and political activities were evident as late as the 1950s, these distinguishing characteristics have all but disappeared. Interview programs in the Saugeen and in similar areas of rural Canada (Manning and Eddy, 1978; McRae, 1977, 1980) have clearly indicated that the goals of rural people are increasingly more like those of their urban counterparts. The rural community of the late 1970s aspires to automobile and television ownership, leisure time, and an annual vacation. These increased expectations can only be satisfied by greater returns to farming. The traditional rural ethic could conceivably be maintained in the form of nostalgia only by newcomers and by the older rural community (McRae, 1980).

Through their desire to earn more from their inputs, Saugeen farmers have made changes in their farm operations through several means: farm enlargement, more intensive land use, mechanization, or off-farm work. Thus, the urban values and aspirations adopted by the rural community augment the impact of the cost/price squeeze on area farmers and help to accelerate the trend to larger, more mechanized commercial farm units. Part-time farming and off-farm work have been the logical alternatives for those unable or unwilling to expand their farming activities.

Table 5.11

Lifestyles - Canada, Ontario, Saugeen Valley, 1971

(Percentage of Households Possessing Facilities or Appliances)

	Running Water	Bath or Shower	Flush Toilet	Refrige-erator	Home Freezer	Electric Dish-Washer	Auto-matic Dryer	T.V.	Auto-mobile*	Owned Vacation Home	Total Occupied Dwelling Units
Canada	96.1	90.8	93.1	98.1	33.5	13.0	40.3	95.3	77.7	6.5	6,030,805
Urban	99.2	95.6	97.5	99.1	27.9	13.9	40.7	96.4	76.6	7.3	4,738,125
Rural	84.4	73.5	77.3	94.2	54.2	10.0	38.7	91.4	81.7	3.8	1,292,680
Non-Farm	85.4	74.0	79.0	93.4	45.1	9.5	36.1	90.9	78.9	4.3	964,255
Farm	81.7	72.0	72.0	96.4	80.8	11.3	46.2	92.7	90.0	2.4	327,425
Ontario	97.9	94.5	95.7	99.2	32.7	8.4	41.7	96.4	80.4	7.2	2,225,210
Kitchener C.M.A.**	99.7	98.0	98.7	99.6	31.7	6.6	44.2	96.4	83.6	5.7	66,575
Toronto C.M.A.**	99.6	97.1	97.9	96.6	22.1	9.5	36.1	96.6	77.0	9.1	773,825
Saugeen	99.9	82.4	84.1	96.4	71.1	4.9	44.5	92.1	60.2	2.3	10,165

SOURCE: Statistics Canada, Catalogue No. 93-738, Vol. II Part 4, and unpublished data.

* Does not include trucks.
** The two metropolitan areas nearest to the Saugeen.

The Influx of Urbanites

The Saugeen Valley is about 150 kilometers from Toronto. Access from the urban centres of southern Ontario to the Bruce Peninsula, the Lake Huron beaches, and Georgian Bay brings many urban residents through the Saugeen Valley. The influx of urbanites takes four forms: 1) vacationers; 2) transients; 3) part-time residents; and 4) full-time residents.

Urbanites seeking recreation within the Saugeen include tourists heading for beaches at Kincardine, Port Elgin, and Southampton, owners of recreational farms and properties within the Saugeen region, and people wanting to hike, cross-country ski, snowmobile, hunt, etc. Fishing is popular in the streams of the Saugeen and in the recreational lakes of Bentinck, Glenelg and Holland townships.

The survey of property owners in the Saugeen Valley showed that 89% had some recreational activities on their land, principally hunting, hiking, and snowmobiling or other winter sports. Such nuisance factors as damage to property arising from recreational use were a problem for 12% of those surveyed; 19% posted their land with "no trespassing" signs, a clear indication of perceived impact. While there is a discernible increase in recreational activities, it is mostly concentrated along the Huron shore and in the central lake area of the valley.

The second type of impact from urbanites is related to those passing through the valley on their way elsewhere. The transient tourist is served by a proliferation of restaurants, craft shops, and antique markets which line the principal routes through the Saugeen. In some of the hamlets (e.g., Williamsford), these demands

The Saugeen River is a scenic feature of the area.
J.D. McCuaig

The Lake Huron shore is a popular tourist destination in the Saugeen Valley.
J.D. McCuaig

have resulted in more tourist-oriented facilities, augmenting a former rural/service orientation. The transient tourists have, however, little impact off the major roads, and there has been little development of market gardening or roadside sales within the region.

Another type of transient urbanite is the worker at the Bruce Nuclear Station. The demand for municipal services has increased, and several trailer parks have grown on the boundaries of existing communities (e.g., Tara, Port Elgin, and Walkerton).

The third category of urbanite influx is urban residents who purchase second homes or recreational properties in the valley. Harker, in his 1976 study of Glenelg and Egremont townships, found a significant proportion of the properties in this part of the valley owned by non-residents. These residents contribute to the urbanization process by their very presence, though they participate less in the rural community than do permanent residents (McRae, 1977, 1980).

The fourth category of urbanites is former urban residents who settle in the valley and thereby contribute to the urbanization process. Typically these people are retired, new farmers, hobby farmers, or commuters to local employment centres. Those who take up residence on a permanent basis may become part of the local society and affect that society through their urban values. Part-time residents, however, tend to participate less in the rural community, and thus affect it less, except insofar as an increasing proportion of the rural population is no longer strictly "rural" (Gertler and Crowley, 1977; Russwurm, 1974, 1975; Troughton, 1975).

While the questionnaire found only 14% of valley holdings in other than commercial agricultural use, this figure actually underestimates the amount of urbanite influx. No properties smaller than one hectare in size were included in the survey, thus eliminating many of the cottages and smaller rural residences. From 1961 to 1971 (1976 data not available), the census shows

the percentage of non-farm, rural residents rose from 22% to 36% in the Saugeen. Towns and villages of the valley have also grown. The Town of Hanover, one of the largest centres in the region, has attempted to expand its boundaries onto prime farmland, a move opposed by the rural community and resulting in hearings before the Ontario Municipal Board (Hanover *vs*. Orland Magwood, Ontario Municipal Board, 1979).

The influx of urbanites into the area has not been sufficient to cause major changes in community services (e.g., schools, library, road clearance) in the region. The rural centres by and large still serve the needs of the farming community, with stores stocking commercial farm requirements alongside the lawnmowers and garden gnomes, and farm associations continue to thrive within the region (e.g., Bruce and Grey Chapters of the Ontario Federation of Agriculture, 4H, Co-op stores).

While the influence of urban dwellers is not as pervasive as it is in regions like the Muskoka of Ontario or areas closer to large cities, a discernible reaction by some landowners has produced alterations in land use.

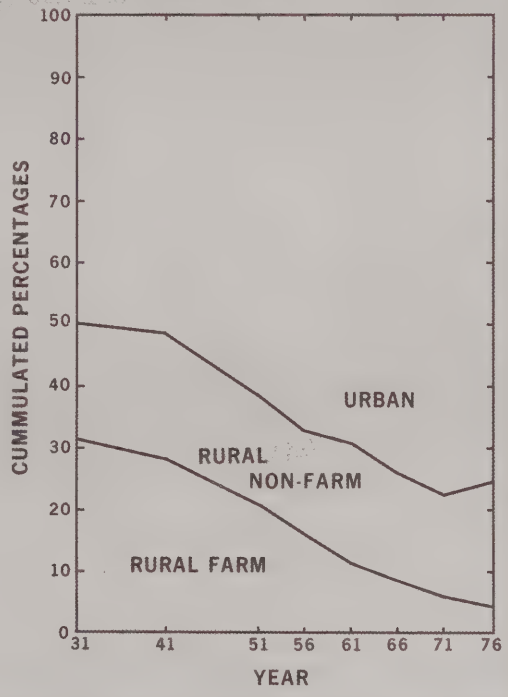
There are more incentives for severance of small properties, primarily for rural residence and cottaging. According to realtors in the region, increased demand from urbanites has contributed to escalating land values, especially for smaller properties (see above). Aside from these examples, the urbanite influx has little direct impact on farmland use within the valley. However, the advent of the urbanites, along with the diminishing number of farmers, has helped to blur the rural character of the Saugeen and has accelerated the urbanization of local rural values.

Country to City and Back

Canada at Confederation was predominantly a rural nation. Approximately 80% of the population was rural, but by 1976 about 80% dwelt in urban centres. While the rural population declined in proportion to the total population, the actual number remained stable and only declined relative to rapid urban growth.

Until the last ten years (1966-1976), it seemed that this trend would continue. However, closer observation of the rural component reveals that rural farm population (those living in dwellings on census farms) has declined drastically, while the rural non-farm population has increased. Canadian rural farm population declined 40.6% from 1931 to 1966 and in the following 10 years fell another 45.9%, leaving only 4.5% of the total population classed as rural farm. On the other hand, rural non-farm population increased 72% from 1931 to 1966 and increased by half as much again (35%) from 1966 to 1976. In 1971, the rural non-farm labour force held 14% of the occupational jobs in Canada, with the majority being in the service sector, construction and trades, crafts and equipment operating, and clerical occupations. Although the rural non-farm population has remained relatively stable compared to its proportion of the total population, there may now be a new trend with urban dwellers returning to the countryside in pursuit a rural lifestyle.

URBAN RURAL NON-FARM AND RURAL FARM DIVISIONS OF CANADA'S POPULATION 1931 - 1976



Government Programs and Regulations

Government programs and policies at all levels influence the way landowners use their land (Environment Canada, 1980b). Many programs are in fact specifically designed to affect land use. Programs that influence land use do so either intentionally or unintentionally. Such programs and regulations as zoning, building standards, and transportation facility construction directly influence land use by design. Programs unintentionally affecting land use include subsidies, marketing boards, incentives, regulations, taxes, research, etc., which in their administration necessarily produce land-use effects. Because there are so many programs that affect land use in the Saugeen Valley, it is not practical to document them all. Rather, five major types of programs will be discussed to show how they have influenced the use of land in the valley: 1) the local and county planning regulations, 2) marketing boards, 3) the Bruce Nuclear Generating Station, 4) farm consolidation under ARDA, 5) the Canada Land Inventory. These are representative of a broad spectrum of programs, with both intentional and unintentional effects, covering land regulation, construction, marketing, financing, and research.

Planning

Land-use planning in the Saugeen Valley is similar to planning in most areas of Ontario. The broader policy-making function is conducted at the provincial or county levels, while the application of zoning, subdivision approval, site planning, and minor variance occurs at the local or municipal level, with final review and appeals heard at the provincial level. Both Bruce and Grey Counties* are proceeding towards Official Plans that set out zoning, policies for development, procedures for land-use changes, etc. (Bruce County Planning Board, 1980; Grey County Planning Department, 1981). These plans should be approved by 1981 and will affect individual landowners differently according to present land use and desired changes. Building permits, zoning permission, subdivision regulations, separation requirements, and health and safety standards all bear directly on the potential uses of land. In as much as they prevent uncontrolled severances and random subdivisions, these regulations may put an end to some options for landowners seeking the highest economic return from their land.

* Wellington County will not be dealt with here because of the relatively small part of the valley within its boundaries.

The Old Stone Inn, in Williamsford, serves tourists and locals in the Saugeen Valley.
J.D. McCuaig

Saugeen towns continue to expand.
J.D. McCuaig

Despite the lack of formally approved official plans, both Bruce and Grey Counties have had operational planning since the early 1970s; however, the level of controls was minimal until at least 1975 and had little impact during the 1966-76 period (Bruce County Planning Board, 1980; Grey County Planning Department, 1981). The new policies regulate several land uses within the counties and their principal objectives are to maintain, enhance, and protect the agricultural base. Non-farm uses will be directed away from higher capability agricultural land though they may be permitted to locate in restricted areas through by-law amendment.

The new plans must use Ontario's Foodland Guidelines (Ontario. Ministry of Agriculture and Food, 1978) as a framework for rural planning. The application of these guidelines to plan formulation and the effectiveness of the implementation of regulations (e.g., severances, subdivisions) varies from county to county, and it is not clear what the final effect on land use will be in Bruce and Grey Counties.

A further planning instrument with an impact on the eastern part of the Saugeen Basin is the proposed Niagara Escarpment Plan (Ontario Niagara Escarpment Commission, 1979). The plan policies are designed to prevail except where local planning policies are more restrictive. A development control permit must be issued by the Niagara Escarpment Commission for any alterations in land use. The Commission comments on all subdivision proposals and has the power of consent regarding conformity with the policies of the plan in the area within its jurisdiction. The practice of the Commission has been to consent only to farm-related developments and to some changes related to gravel extraction (Grey County Planning Department, 1981, 192).

While rural planning in most of the Saugeen Basin is still in a germinal state, there has already been some impact on the extent of subdivision of rural properties. In the Saugeen questionnaire, 8.5% of respondents indicated they had been influenced by planning prac-

tice, mostly through refusals for land severances or subdivision

The net impact of planning procedures to date has been small, though realtors contend that they have retarded non-farm development in the rural areas of the region. The plans of farmers and other rural landholders have also been affected. However, 74% of the questionnaire respondents favoured the preservation or protection of agricultural land, though not necessarily through government controls.

Marketing Boards

Marketing boards are organized by governments or commodity producers to coordinate the production and sale of a specific product. Some marketing boards are provincial (in Ontario, the Hog Marketing Board is an example), while some are federal (eggs, milk, turkeys). Marketing boards are distinguished primarily by their restrictions on entry into the market, production quotas, standards of operations, and their control of inter-provincial and export trade. Land use is affected principally through limiting the choice of products farmers can produce on their land; land could also be maintained in agriculture because of greater market stability. In some commodities, such as milk, not only are the entry costs high in terms of land, equipment, and livestock, but acquiring a milk quota is also a difficult and usually expensive proposition. Other products, such as hogs and beef, are not limited by quotas, beef not having any form of marketing board. New or expanding farmers, therefore, tend to be directed to certain activities and land uses according to if and how they can acquire quotas. For uncontrolled products such as beef, the markets vary considerably (see Figure 5.3), leading to a boom/bust cycle, while for controlled products such as milk, there is less market variation and greater certainty about future conditions. Generally, marketing boards allow the farmer to plan ahead, invest, mechanize, or enlarge his land holdings with a reasonable chance of recovering his investment; it is this aspect of marketing boards that has had some effect on the economic success and choice of land use of Saugeen farmers.

Logging is still an important industry in the Saugeen Valley.
J.D. McCuaig

A typical mid-size Saugeen farm in Grey County.
J.D. McCuaig

In the Saugeen, 39% of the questionnaire respondents were involved in marketing boards, and over 5% listed boards as a factor in their choice of land use, primarily because of changes in quotas. Entry into dairying or poultry production was restricted by the boards and may have contributed to farmers deciding to concentrate more on beef production. Banks and government reinforced this by urging farmers to get into hogs and beef, despite the fact that both hog and beef markets have had dramatic ups and downs. Quota limits also influenced decisions about purchasing or leasing land, with some surveyed farmers altering the size of their farm to match their quota requirements.

The Bruce Nuclear Generating Station

The construction of the Bruce Nuclear Generating Station (including the original Douglas Point plant) on Lake Huron is an example of large-scale government impact in the Saugeen Valley (Ontario. Royal Commission on Electric Power Planning, 1980). This massive project has had a significant physical and socio-economic effect on the communities of the region and on the local labour pool. Begun in 1960, the various phases of the project occupied a total of 830 hectares of land by 1976. A buffer zone also limits land uses in an area within eight kilometers of the project. Over 3200 workers have been employed in the construction process and most have been housed within commuting distance of the project. In addition, many local workers from the Saugeen region have been attracted to the construction site, causing a shortage of farm labour particularly during peak seasons. There has also been an impact on the wage structure of the farming industry. Alternative job opportunities in transportation, construction, or servicing the needs of a larger base of non-farm workers have been seen by many as an excellent alternative to low-paying farm work. While work on the site may well be temporary, the long-term implications for expected levels of pay could be significant. The effect on land use of this project is, as discussed earlier, to induce farmers towards production

options that are less labour intensive. Sixteen percent of Saugeen respondents, located principally in the townships nearest the site, indicated that the Bruce construction had affected the labour supply for their farm unit.

A significant land-use effect of the Bruce Station has been the related construction of power-line corridors to the power consumption areas in the south and east. Whether or not power-line corridors seriously disrupt farming activities is a matter of some dispute. The fact remains that farmers are disturbed by power lines, at least during construction, and expect compensation for real or perceived problems (Ontario. Royal Commission on Electric Power Planning, 1980). Obviously, the pylons occupy land, and clear cutting is needed when lines cross a woodlot. Machinery use can also be hampered by pylons, and several respondents in the Saugeen cited problems with power lines (5%). Controversy in the media is in itself a manifestation of the magnitude of the perceived land-use effects and problems asssociated with power corridors.

Farm Consolidation Programs

Another effect of government on land use is seen in the joint federal/provincial Agricultural and Rural Development Act (ARDA) programs of the 1960s. Farm consolidation was a particular economic and land-use goal of the Ontario ARDA program, which was designed to achieve more rational and viable farm units in terms of scale of operations. This program provided aid (mainly financial) to farmers wishing to expand their land base or to small farmers wanting to relocate off the farm. In Bruce and Grey Counties from 1966 to 1975, about nine million dollars in ARDA assistance was given for farm enlargement (Canada. Agricultural Rehabilitation and Economic Expansion, 1969; Canada. Department of Regional and Economic Expansion, 1976). This involved about 28,320 hectares of property on 582 farms, with an average of about 49 hectares per farm. Such government assistance clearly affected land use by making mechanized farming at a larger scale both possible and attractive.

The Bruce Nuclear Power site has a significant impact on the surrounding area.
J.D. McCuaig

A small Saugeen farm near Durham.
E.W. Manning

ARDA is not the only government financial assistance program, but it is one of many with varying, and often conflicting, aims and impacts on land use. For example, 55% of the farmers interviewed reported direct government financial involvement in agricultural activities, which included milk and cream subsidies, cow, calf, and beef subsidies, tax rebates, agricultural stabilization programs, and farm credit. Taken together, such programs influence farm economics, thereby affecting landowner decisions regarding the use and management of farmland. By direct intervention in the economics of farm units, government programs have promoted larger, more mechanized, and more specialized farm units in the valley. These programs have been available nationwide in similar forms and with similar goals.

The Canada Land Inventory

Information stemming from research can affect land use. An example is the Canada Land Inventory (CLI) started under ARDA and completed by Environment Canada in cooperation with the individual provinces (Environment Canada, 1970, 1972, 1976). Among other things, the CLI mapped soil capabilities for agricultural production (Environment Canada, 1976). For the first time, easily understood information on agricultural capability was made publicly available. Of course, farmers had been aware of their land capability, and were probably reasonable judges of other land, but the CLI became a part of their vernacular—a yardstick by which land capability could be assessed on a common scale. Awareness of land potential thus became more widespread.

CLI information has directly affected land use through the planning process. Planners have begun to plan on the basis of agricultural capability, directing non-agricultural uses to poorer capability lands. Aside from these direct effects, CLI ratings have become a part of the farm realestate market, with advertising class 1 or 2 land considered an asset to the selling value of the property. In the Saugeen, 22% of farm respondents had heard specifically of CLI maps, and nearly all knew

the "class" of their land. This level of market penetration shows the potential of research and information in affecting landowner decisions and, more importantly, the perceptions on which those decisions are based. The direct impact of the CLI information is difficult to quantify. Along with better soil and cultivation information, the CLI could have contributed significantly to the observed shift of agricultural use to better soils over the study period, both in the Saugeen and nationally.

While only a small range of government activities have been dealt with here, it is clear that governments can and do play a significant role in determining land use and consequently the forms agriculture takes in Canada.

The involvement of government agencies through such measures as zoning, subsidies, infrastructural assistance, and marketing boards can assist in reducing uncertainty for farmers. By simplifying the decisions farmers must take, government can also reduce the risks involved in choices whose financial success is evident only after a long period of time. Conversely, government programs may restrict the range of options open to farmers (zoning, severances, interest rates), and, if uncoordinated, different programs can inadvertently cause uncertainty and economic dislocation.

As a final note, the role of government in land use appears to be an accepted fact of life. On the question of agricultural land preservation, 71% of all respondents (including 67% of farmers interviewed) wanted a greater degree of government involvement in agricultural land preservation. This included legislation to stop loss of farmland and improve zoning, as well as specific government assistance for the economics of farming and marketing.

The Cumulative Impact of External Factors

All of the factors discussed above can influence the farming community profoundly. Farmers cannot remain static. Just to survive, farmers must decide whether to become larger, more intensive, and more efficient or turn to part-time farming supplemented by off-farm income. Those who are willing and able to capitalize follow the first option; those who cannot, or will not, become part-time farmers or leave farming. The influx of urbanites and the rising demand for the land supply present landowners with a greater range of opportunities than they had before, particularly if they wish to sell. Increasingly, farmers are faced with more complicated decisions and with greater uncertainty regarding long-term economic and land-use prospects for agriculture. At the same time, economic factors and changes in labour supply and in farmers' attitudes require choices to be made in order to satisfy rising expectations. Thus, the farmers of the Saugeen have been given few options—they have had to make more money or abandon full-time farming.

Chapter Six

THE DECISION-MAKING PROCESS AND RURAL LAND-USE CHANGE

The pattern of land use in Canada today is the legacy of countless decisions made by individual landowners from the time of earliest settlement to the present. This chapter examines the decision-making process and details how individual decisions affect changes in land use, thereby producing the contemporary Canadian land-use mosaic.

Previous chapters have documented a wide range of factors that contribute to land-use change both at the regional and national level. Chapter Five discussed the relationship of causal factors to observed land-use changes in the Saugeen Valley. Figure 6.1 documents in a simple format the observed relationship between land-use change and the various factors causing that change. This matrix is based on a subjective review of landowner responses in the Saugeen case and indicates the approximate magnitude of the relationship between causal factors and specific land-use changes.

The most important causes of change were those related to changing inputs to farming, the rising demand for land, changing economics of agricultural production, and technological advances in farming. The impact of economic factors is reinforced through various combinations of other causal factors as illustrated in Figure 6.1. Technological advances generally facilitate farm enlargement and intensification, thereby increasing the capital requirements of farming. Labour availability played a minor role in most observed changes and has mainly contributed to the trend towards larger, more mechanized units. Government programs have been pervasive with both positive and negative effects on almost all of the use changes identified, but, because of their diversity, they are not coordinated to achieve particular land-use ends. Urban influence in the Saugeen has been secondary to the economic factors and has chiefly reinforced trends to farmland loss, leasing and fragmentation. Urban impact has not been a prime factor in any of the observed changes. Against all of these changing conditions are the increased expectations of rural residents who require more to meet those expectations. If greater income cannot be derived from the land, it can only be sought elsewhere.

The matrix reveals a complex relationship between causal factors and land-use changes. These causal factors are translated into the Canadian pattern of land-use change through the decision-making process at the primary level of the individual landowner. The causal factors in effect stimulate the need and opportunity for deciding whether to capitalize or to reduce the farming enterprise in part or in whole.

The individual land-use decision is the product not only of the external factors documented in Chapter Five, but also of numerous internal conditions relating to the type of property owned, individual opportunities, family situation, age, savings, debts, personal values, attitudes, and expectations, and the economic opportunities available at any point in time. Thus, any given factor influencing land use in a region is filtered through the perceptions of an individual decision-maker who weighs all the circumstances according to his personal aims and objectives in making a particular land-use decision (see Figure 6.2). Internal conditions are what separate those who choose to enlarge and capitalize from those who elect to remain static or withdraw from farming. (For similar models see Brown and Moore, 1970; Wolpert, 1965, 1966.)

Rural landowners are a diverse group of individuals of different ages, backgrounds, and occupations, with many different types of properties and pursuing a multitude of different activities. These differences influence how the individual decides to use or to change the use of the land which is owned or leased. The initial stimulus for land-use change is usually external, but it can be generated also by individual alterations in lifestyle, aspirations, age, or family status.

The way in which a landowner responds to internal or external stimuli is influenced by the combination of two types of factors: the first affects individual ability to respond, the second is the willingness to react.

◀ Morning mist over Assomption Valley, Quebec.
Pierre Gaudard, NFB Phototheque

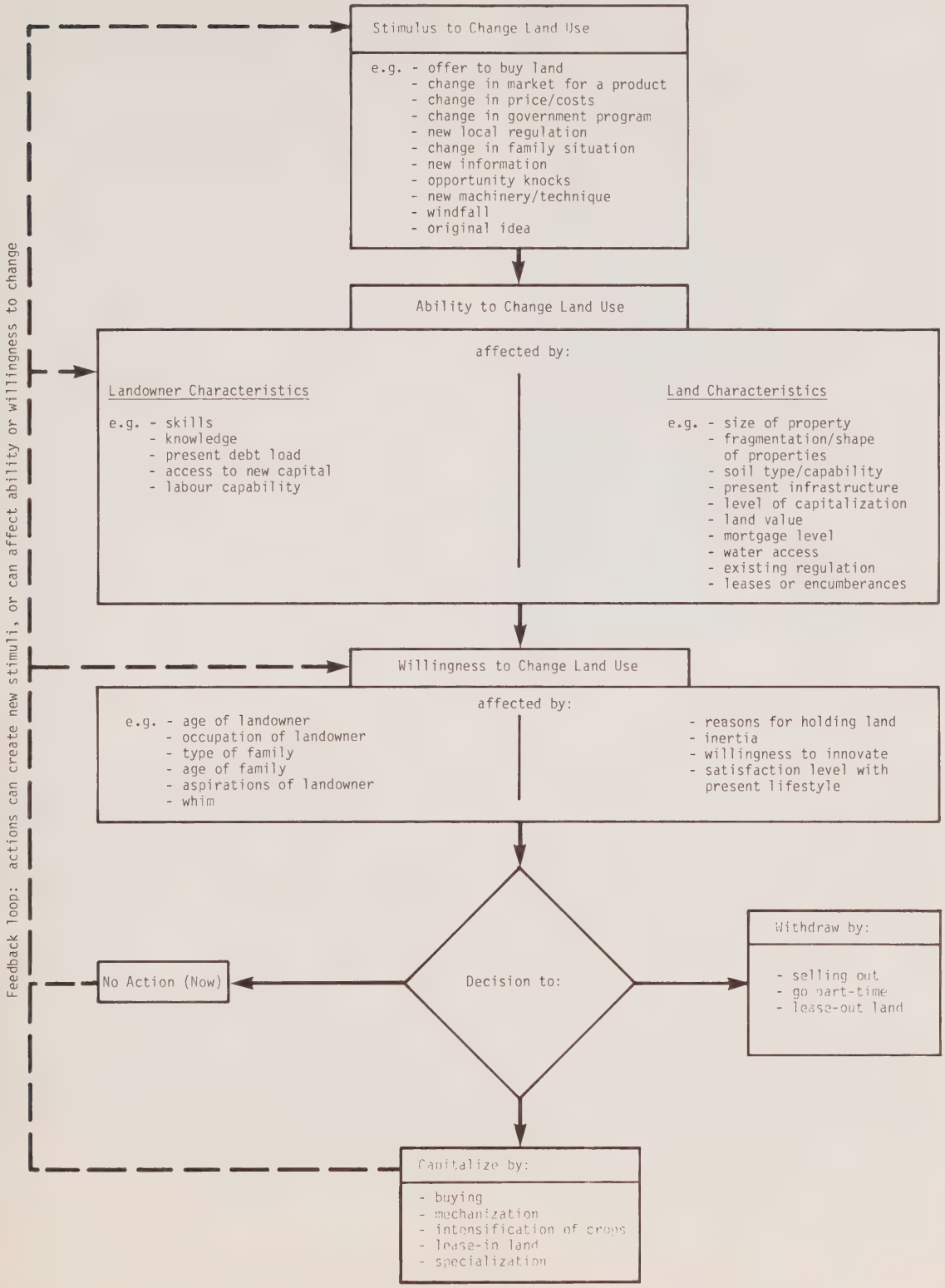
FIGURE 6-1
Relationship of Causal Factors to Rural Land Use Change in the Saugeen Valley

Key: Causal Relationship
□ major importance
△ secondary importance
• minor importance
··· no significant relationship

CAUSAL FACTORS (Ch5)	CAPITALIZATION					WITHDRAWAL				
	BREAKING NEW LAND (generally better land)	INCREASED LEASING IN	FARMLAND CONSOLIDATION (growth)	INTENSIFICATION OF FARMING	SPECIALIZATION (industrialization of farms)	PART TIMING	INCREASED LEASING OUT	FRAGMENTATION OF PROPERTIES	LAND IDLING OR ABANDONMENT (generally poorer land)	FARMLAND CONVERSION TO OTHER USES
RISING DEMAND FOR LAND a) for farming b) for non-farm use	□ •	□ •	□ ···	□ ···	• •	• •	□ ···	··· □	··· ···	··· □
CHANGING ECONOMICS OF AGRICULTURAL PRODUCTION	□	□	□	□	□	□	△	△	△	△
TECHNOLOGICAL ADVANCES	□	□	□	□	□	△	□	···	□	•
CHANGING LABOUR AVAILABILITY	•	•	△	•	△	□	•	•	•	△
URBANIZATION OF RURAL ATTITUDES	△	△	△	△	△	□	•	•	•	△
INFLUX OF URBANITES	···	···	···	···	···	•	△	□	···	□
GOVERNMENT PROGRAMS AND REGULATIONS	•	···	△	△	△	···	···	•	△	•
	MORE LAND			DIFFERENT FARM PRODUCTION STRATEGY		PARTIAL WITHDRAWAL			COMPLETE WITHDRAWAL	

Figure 6.2

The Decision Process for Rural Land Use Change: A Simple Model



Harvesting peaches in Niagara Falls, Ontario.
Julien LeBourdais, NFB Phototheque

The first type of factors relate to the farm and the individual owner and limit the *ability* of the individual to respond to a given stimulus. While opportunities (or need) may exist to make changes, the property itself is often not amenable to alterations in land use. Because of small size, fragmentation into many parcels, soil quality, or simply odd shape, the property might not be capable of supporting mechanized agriculture or activities that require large land areas for scale economies. Physical characteristics of the property—drainage, soil, and overall capability for agriculture, recreation, or forestry—may limit the ability of a landowner to alter activities into any particular use. Present infrastructural investments and levels of capitalization, as well as the value of the land and the level of mortgage payment, may preclude certain activities from a particular parcel, at least for the present owner. The personal skills of the operator or owner and the ability to innovate or take risks are also limits on whether the owner can alter land use or undertake particular types of intensification. Similarly, whether the owner can borrow money may limit access to new capital, or management skills and knowledge may limit the amount or type of labour that can be attracted or maintained. Furthermore, such government regulations as zoning may prevent or limit the farmer's ability to use the land as he would like to.

Even if a farmer has the personal and economic ability to respond to a given stimulus, the *willingness* to change could vary considerably. As shown in Figure 6.1, among the factors influencing willingness to change are the age and occupation of the landowner, the type of family structure, and whether or not the family has sons or daughters prepared to continue using the land after the present owner retires. Whether or not landowners are satisfied with what they have or have other specific ambitions is also significant. In fact, many unique factors can motivate the individual to make particular land-use decisions. In a study of landowner behaviour changes in New Zealand (Manning, 1972), one individual remained the final hold-out as a pastoral agriculturalist in a region where all other landowners had become intensive horticulturalists. The sole reason for the remaining land-use anomaly was the financial independence of the individual owner and the fact that she liked sheep. In the Saugeen, Mennonite farmers stay with animal power, while all their neighbours have turned to machinery. Thus, even whim or commitment to an ideal can play an important role in the eventual land-use decision.

Landowner Responses in the Saugeen Valley

Several characteristics differentiating the responses of landowners to external stimuli were analyzed in the Saugeen study. Twenty-three percent of respondents to the Saugeen survey made changes in their land use in the 1971 to 1976 period. Why did they make these changes? How did ability and willingness to change separate those who made changes (23%) from those who did not (77%) in the five years surveyed?

Personal Factors

The ability and willingness of the landowner to alter his land use are, of course, inextricably linked. Skills and knowledge are related to age as is access to capital, and aspirations could reflect known capabilities and limitations.

Age of the landowner was related to specific land-use changes. Landowners under 50 years of age were one and one-half times more likely to change land use than those in their fifties. The oldest landowners (those over

70) showed an above-average propensity to sell property in order to reduce the size of their farms. Buyers of land were generally under 50 years old, the sellers older (see Table 6.1). Twenty-five percent of those under 50 had bought, whereas only 7% had sold. The level of land-market activity, including leasing, also declined with age, notwithstanding more frequent property sales among older landholders. For most farmers up to the age of 60, activity in the land market was therefore generally associated with growth.

The family structure of respondents affected their willingness to change land uses. Landowners with larger families (more than 3 children) resident on the property showed a somewhat greater tendency than others to acquire new property or make capital investments, generally with long-term expansion in mind.

The aims of landowners were significant in relation to specific actions (buy, sell, intensify, etc.). At the time of the interview, those who owned land primarily as a retirement residence reported a significantly higher than average rate of land sales, reinforcing the findings related to age and market activity. Owners who were holding land mostly as an investment also reported a significantly higher than average rate of land sales and significantly higher rates of land purchase than average. Land leasing was done primarily by those owning land for livelihood. These findings are hardly surprising.

Improvements to the farm property were related to the reasons for holding land (Table 6.2). For example, fence removal for consolidation was undertaken mostly by those holding land for livelihood and lifestyle reasons.* In each case, over 40% had removed fences, far exceeding the average for those improvements. Similarly, woodlot clearance, field drainage, and construction of farm buildings were reported with significantly greater than average frequency by those who held land for livelihood or lifestyle reasons. Woodlot

* The definition of lifestyle was left to the respondent and was generally taken to mean a rural rather than an urban way-of-life, with some degree of self-sufficiency and independence. Thus, many *bona fide* farmers selected "lifestyle" to mean farm life.

A family providing labour for haying in Inverness, Cape Breton Island.
E.W. Manning

Table 6.1

Activity in the Land Market by Age Group
Saugeen Valley 1971-76

Age Group	Buying (%)	Selling (%)	Leasing (%)	Total % Active in Land Market (%)
Under 50	24.5	6.7	10.2	41.4
50-59	13.4	10.2	8.7	32.3
60 and over	2.8	17.0	5.7	25.5

NOTE: Activity in the Land Market by Age Group has a significance value of .001.

SOURCE: Questionnaire.

Table 6.2

Action Related to Reason for Landholding - Saugeen Valley

(Figures represent the percent of respondents giving particular reason for owning land who undertook each activity)

Actions / Reason for Landholding	Fencing	Fence Removal	Woodlot Clearance	Woodlot Planting	Field Drainage	Farm Pond Construction	New Farm Building
Livelihood	9.2	42.9	7.7	5.3	32.3	4.3	36.7
Lifestyle	12.8	48.7	11.5	2.6	33.3	8.9	29.5
Recreation	26.6	13.3	6.7	53.0	6.7	6.7	0
Residence	9.6	17.0	1.3	4.1	10.9	5.5	17.8
Investment	24.2	9.0	12.1	9.1	24.2	3.0	27.3
Retirement	17.0	17.0	2.4	4.9	9.7	9.7	9.8
Percentage of all respondents	12.3	35.3	7.1	6.4	25.5	5.8	27.9

NOTE: This is a multiple response table where any respondent could indicate as many actions as were appropriate.

"Fencing", "Fence Removal", "Woodlot Planting", "Field Drainage", and "New Farm Building" significance values vary between .10 and .001.

"Woodlot Clearance" and "Farm Pond Construction" are not statistically significant due the to relatively small number of individuals who took these actions relative to the total, but are included to compliment the other actions taken.

planting and new fencing were reported with greatest frequency on properties held for recreation purposes. Investment properties had frequent fencing and field drainage, primarily to enhance the land's value. The lowest overall level of land improvement was reported by those holding property for residence and retirement purposes.

Land Characteristics

The Saugeen survey also found a relationship between property characteristics and propensity of the owners to make changes, with property size frequently corresponding to land-use changes (Table 6.3). Owners of the largest-size properties (over 160 hectares) reported the greatest tendency to change land use (41%), though owners of much smaller properties (11-20 hectares) exhibited a similar penchant for change (38%). Of the intermediate-sized holdings, (from 21 to 160 hectares) about one in four had changed land use with the smallest holdings the least likely to have alterations in land use (less than 10% of properties under 10 hectares had changed). The high rate of land-use changes among the largest holdings indicates the continuing adjustment of the larger commercial farms to meet new market conditions. The similarly high rate of changes in the 11-20 hectare group shows the response of the smallest commercial units to changing market conditions: they can intensify, turn part-time, or withdraw. The intermediate-size units had neither the same need to change as the smaller units nor the range of opportunity to make changes of the larger ones.

Data on land purchases and sales (Table 6.3) reveal a relationship between land-market activity and property size. The sellers have been holders of middle-sized properties (11-80 hectares), while the buyers have preponderantly been holders of either the smallest or the largest properties.* The Saugeen land market has been active, especially for the smaller-sized properties—an indication of the increasing rate of purchase of properties under 10 hectares noted by local real estate agents. At the other extreme, the owners of the

* Some of the sellers of land were not, of course, available for the interview, having sold out and left.

Table 6.3

Land Use and Property Changes by 1976 Property Size - Saugeen Valley

(% of properties in size class)

Changes Made \ Property Size	Under 4 (ha)	4-10 (ha)	11-20 (ha)	21-40 (ha)	41-80 (ha)	81-120 (ha)	121-160 (ha)	Over 160 (ha)
Change in Land Use Since 1971	10.0	8.3	38.1	15.2	23.3	24.0	27.1	41.2
Purchased Land	40.0	25.0	19.0	7.6	15.5	12.5	20.0	44.1
Sold Land	5.0	16.7	14.3	11.4	12.9	4.8	10.0	11.7
Leased Land	0.0	8.3	0.0	5.1	6.9	9.6	15.7	17.6
Intensified	15.0	16.7	23.8	21.5	31.0	27.9	40.0	50.0

NOTE: "Change in Land Use since 1971", "Purchased Land", "Leased Land" and "Intensified" significance values vary between .05 and .001.

"Sold Land" is not statistically significant due to relatively small number of individuals who sold relative to the total but is included to compliment other changes made on land.

SOURCE: Questionnaire.

largest properties have been purchasing in order to expand their land base and thus improve their viability. The mid-sized property owners include three types: those selling land to withdraw or become part-time, those purchasing land to remain viable as larger properties, and those able to maintain production on existing units, often through intensification, specialization, or leasing-in of land.

The amount of intensification also correlates well with property size, with intensification occurring more on larger properties than on smaller. Many of the smaller units are part-time farms and recreation-oriented. Part-timers have responded to changing economic circumstances by off-farm employment.

Over 25% of those whose holdings in the Saugeen were predominantly CLI agricultural Class 1 land made land-use changes from 1971 to 1976, primarily increasing crop acreage (farm expansion) and intensifying crop type. Similarly, over 25% of those with Class 5 land and nearly 20% of those whose holdings were Class 6 land altered use, principally by removing the land from farming. Holdings of mainly Classes 2, 3, or 4 land were less prone to change, with only 15% having done so since 1971. In concert with the national trend, changes in land use in the Saugeen have been occurring most rapidly on the best and the worst lands: the best provide the advantage for greater opportunities, while the poorer must be altered to remain viable or be eased out of farming.

The maps of land-use change in Chapter Four demonstrate these physical alterations in agricultural land use. The intermediate quality units probably had neither the degree of opportunity nor the need to change relative to those units on better or poorer land.

Location and physical surroundings also, of course, play a significant role in deterimining which lands are converted to recreational use. Many of the Saugeen holdings that had changed to recreational uses were located in the hilly and attractive regions of Glenelg and Holland townships, on the lakes in Sullivan township, or near the resort areas of Port Elgin and Southampton.

The information from the questionnaire offered several other factors potentially relevant to land-use change: land value, fragmentation, leasing, whether property was to be passed on in the family, and adoption of technological innovations and practices. Leasing in and land fragmentation related to changes in a similar manner as property size, though not with the same level of significance. Land value did not correlate well with any of the measured changes in use. Specific innovations such as forage harvesters, while correlating well with intensification, were more an indication of the intensification process rather than a leading cause. Age and number of resident children related far more clearly to actions than did stated intentions to pass the farm on to family members.

The Decision to Capitalize or Withdraw

The research confirms that various characteristics of landowners and their land have affected the decision process with respect to land use in the Saugeen. The most important factors regarding ability to change were the size and agricultural capability of the property. It was not possible within the scope of this study to evaluate landowner ability separately from willingness to change. The personal characteristics that most affected land-use decisions in the Saugeen case were age, family, and the primary reason for owning property. Separate evaluation of specific indicators of landowner ability and willingness would be productive through more detailed behavioural research.

The Saugeen research and principally the field interviews have permitted some generalization about the characteristics of those who have capitalized, those who have turned to part-time operations, and those who have withdrawn from agriculture. Landowners whose response has been capitalization (expansion, intensification, specialization) were generally younger, with larger than average holdings already heavily capitalized. They owned land either because they wanted a farming lifestyle and/or needed to earn a living. They occupied land with good prospects for increasing profits from improvements, and they could foresee returns accruing from their investment in their properties. Perhaps most importantly, they were planning a long-term farming future for themselves or their families.

Part-timers generally held smaller units. While some were working part-time in order to accumulate enough capital for a full-time operation, others were satisfied with the mix of farm and off-farm work. Older part-timers were often in a process of withdrawing from farming (i.e., semi-retirement), particularly if no family succession was foreseen.

Owners who left or abandoned land were often holders of smaller, poorer quality holdings or were provided with the opportunity to subdivide or sell. Whether land was abandoned or was sold for other uses depended primarily on whether a market existed for the land.

In the Saugeen microcosm, changes in land use were the product of individual land-use decisions made by

A cattleman faces a stark choice: to change his business or lose it

By OLIVER BERTIN

Cattleman Donald Woodrow is growing corn for the first time in 21 years. He is giving up his cattle business for one good reason — he cannot afford to lose any more money.

It was not an easy decision, but like hundreds of other cattle producers in Southern Ontario, he is convinced that he will face bankruptcy if he continues to run an uneconomic operation.

Mr. Woodrow, who farms near Craighurst, 35 kilometres northwest of Barrie, is saddled with costs that have been rising faster than the price of beef. The result is hard to argue with, he said, because he loses $200 every time he sells a steer.

His plight is typical of the economic bind affecting many of Canada's 160,000 beef producers. They can no longer afford to sell beef for less than it costs to produce, and many are switching to cash crops until prices pick up.

The farming situation is illustrated by a recent Statistics Canada survey, which compared costs and receipts for Canada's 325,000 farmers from 1971 to 1980. The report included the traditionally well-off sectors — such as chicken producers, soybean growers and dairymen — along with financially troubled beef and hog producers.

The statistics show that total operating expenses have risen faster than receipts. During the 10-year period, expenses increased 364 per cent, while livestock receipts rose 315 per cent.

With an increase of 342 per cent, cattle prices have kept up better than calf prices, at 284 per cent, and quite a bit better than dairy and egg prices.

By contrast, crop prices have largely kept up with costs.

On the cost side, Statistics Canada found that any farmer who borrows a lot of money or buys energy-based chemicals is spending more than he is making from increased receipts.

Interest charges rose 595 per cent in the 10-year period, fertilizer 612 per cent and pesticides 841 per cent.

The costs of machinery and diesel fuel did not rise as fast as receipts — 272 per cent and 274 per cent respectively — but they were not far behind.

Mr. Woodrow is an experienced feedlot operator who has run an efficient business for a long time. He is not facing imminent bankruptcy, but he is subject to the economic pressures that hurt all beef producers.

He has raised cattle since 1960 and has run his own feedlot operation on a 200-acre farm since 1966. In concept, it is a relatively simple operation, requiring a good supply of operating capital, a good eye for the markets and a well-run operation.

Every fall, Mr. Woodrow borrows about $200,000 from the bank and buys a herd of six-month-old steers from the West. He feeds them home-grown corn and hay for about 10 months and then sells them to a packing house for slaughter. When he receives the cash, he pays off his bank loan and starts all over again.

It is a business that can be very profitable, but it is greatly dependent on three factors — the cost of producing feed, bank interest rates and the price of beef in the retail market. This year, Mr. Woodrow has been hit hard by two of these factors, while the third has remained stable.

The cost of growing feed has soared, pushed up by the cost of fertilizers and pesticides. Bank interest rates have climbed. Local beef prices have remained stable at about $75 a hundredweight.

Mr. Woodrow used one steer to illustrate his point. He bought the steer last fall for $598, borrowing money at about 20 per cent. In the past 10 months, he has spent $99 on interest and $486 on feed to bring the steer up to its selling weight of about 1,300 pounds.

He totals these figures to reach his direct costs for that steer — $1,183 — and this does not include veterinary bills, loss, depreciation or overhead.

Yet when Mr. Woodrow takes the steer to market, he will receive only the current price of about $75 a hundredweight or $975. This means a loss of $208, before indirect costs are added.

Mr. Woodrow is not a complainer and he is not a spendthrift. He drives a 1975 Pontiac he bought as a demonstrator; most of his machinery was bought secondhand; and he makes do with an eight-year-old corn sheller he bought for $2,800 because the combine harvester he so badly needs costs too much.

Although Mr. Woodrow has lost so much money feeding cattle, he blames the system, not the banks or the consumer. Still, he would like to see consumer prices rise a little bit or the banks become more lenient with their interest rates.

"I think the banks should give us a little break on interest," he said. "Even 1 per cent on interest would make a difference. It won't solve the problem, but it helps. They raise the rate a lot quicker than they pull it down."

Mr. Woodrow does not blame the consumer cheap-food lobbies, even though Canadians buy beef for less than cost.

"I don't need a terrible lot more to break even. Ten cents a pound would make the difference. It would allow me to pay my bills and leave $20,000 to live on."

It has been said that only the inefficient farmers are going to the wall and that the current rash of bankruptcies, foreclosures and liquidations is beneficial in that it is part of a cleansing process to weed out marginal producers.

But Mr. Woodrow thinks differently. There are many good farmers in his area who just cannot afford to run their businesses any longer, he said.

"Only a couple of farmers in this area farm full-time. The others have to work part-time to pay the bills. They get up at 5 or 6 a.m. to do the chores and then do the haying after work. It makes for a long day."

Currently, Mr. Woodrow is shouldering an $80,000 operating debt. A few years ago, he refinanced his business to provide himself with more credit. He works three weeks every winter plowing snow at a local ski resort to earn extra money. And, for the entire year, he works a six-day week.

"We sit there on a Saturday afternoon when we're out in the sun pulling grain and watching the city people drive by on their day off and we say: 'Boy, aren't we the stupid ones? We could be there too, heading out every weekend.' "

"On Saturday when we're pulling grain, watching city people on their day off, we say: 'Boy, aren't we the stupid ones?' "

THE SPIRAL IN FARM COSTS

(in $ millions)

	1971	1980	% rise
Costs			
Total operating expenses	2,861	10,407	+ 364
Interest charges	267	1,591	+ 595
Machinery	586	1,597	+ 272
Fertilizer	323	1,978	+ 612
Feed	561	1,753	+ 312
Receipts			
Total farm receipts	4,548	15,638	+ 344
Total crops	1,758	6,900	+ 392
Total livestock	2,641	8,318	+ 315
Cattle	943	3,234	+ 342
Hogs	399	1,403	+ 352
Dairy	706	2,061	+ 292

Source: Statistics Canada

SOURCE : BERTIN, O.; GLOBE AND MAIL, TORONTO

Ottawa's Byward Market allows some producers to sell directly to the consumer.
E.W. Manning

each landowner in light of the constraints and opportunities unique to each. The sum of these responses adds up to a selection process by which the pattern of land use is changed: those who are willing and able make the changes necessary to ensure continuing satisfaction of their requirements through farming; those who cannot or will not seek other income sources and change land use through abandonment, sale, lease, or a reduction in use intensity.

At the regional level, this selection process has produced: 1) the concentration of agricultural production on better land, coupled with the loss of poorer land from agriculture; 2) fewer and larger farm units; 3) a greater degree of intensification on that land remaining in farms, with greater mechanization, more intensive crops, and more investment in improvements; 4) the continuing growth of non-farm uses on land that was previously agricultural.

Chapter Seven

FROM THE FARM TO THE NATION

Changes in agricultural land use at the national level are the product of farm level changes within the many regions of Canada. As individual farmer decisions produce changes in the regional land-use pattern, so do regional trends produce significant alterations in the nationwide extent and nature of rural land use. The Saugeen case assists in the interpretation of the national data, since it reveals processes at work at the level of the individual farm and farmer. The case study also demonstrates the type of pressures being brought to bear on rural landowners and how, in one area, they have responded.

Processes: Building the National Agricultural Land-Use Pattern

The national pattern emerges through a process of accumulated individual decisions. Understanding how landowners decide and who is affected by what identifies the impact on the farmer and on the rural land resource of changes in such factors as costs, land markets, and government programs. The present trend, as illustrated in the Saugeen case, is towards a selection between those able to enlarge production volumes or values and those lacking the willingness or ability to adapt to the changing demands of farming. The national data suggest that a similar process is occurring, with regional variations, throughout Canada. The withdrawals in the east and advances in the west may be based on a greater potential for expansion through the use of new techniques and the application of capital in these advancing regions than in the areas of retreat. Further studies, focussing on the advancing frontiers and retreating margins would provide a greater understanding of the processes at work. Specifically, who is breaking the new land and why? What lands are being abandoned, and what is their present use? What are the implications for the landowners and the nation?

While it would be unwise to extrapolate the trends observed in the Saugeen to the nation, the national data trends are strikingly similar to those evident in the Saugeen, therefore making it possible to speculate about parallels in the processes involved.

The national changes in agricultural land use documented throughout this paper are economically logical, with resources apparently being concentrated in those regions where the greatest production relative to input can be obtained. Inputs have been concentrated in areas where the land is most responsive to mechanization and more intensive farming practices—the prairies and southern Ontario (Statistics Canada, 1981; National Data Base). The value of all land, and particularly of good farmland, has continued to increase at a rate substantially greater than that of general inflation, and greater capitalization has meant increases in productivity per unit area on those lands remaining in farming (see also Regional Municipality of Waterloo, 1981, 14, for similar conclusions). Thus, at the national scale, there are fewer but more intensive farms on less but more heavily-farmed land. An increasingly greater reliance is being placed on a smaller and more specialized agricultural base.

In the long-term, such concentration of production may have consequences for the land resource, through nitrogen depletion, loss of organic matter, salinization, or soil mining. Withdrawal of agriculture from more remote lands with lower agricultural capability could result in these lands being alienated in favour of such uses as recreation and restocked woodland, barring them from future expansion of farm production. Although such lands could be considered as a reserve, fragmentation, ownership changes, and lack of continued management would create a major obstacle to their reintroduction to agricultural use. A more limited, heavily capitalized, energy dependent, and fragile agricultural base will consequently have serious implications for the future price and security of the nation's food supply.

Consequences: From the Individual to the National Perspective

What happens to the agricultural land resource is critically important to the individual land-holder, the regions, and, indeed, to the entire nation. The consequences of changes in the use of agricultural land

◀ Some of Canada's best agricultural land in Essex County, Ontario. E.W. Manning

The Codroy River Valley is an important agricultural area in Newfoundland.
John DeVisser, NFB Phototheque

range from direct social and economic pressures on individuals through to concerns for long-term regional and national self-sufficiency in food (Bentley, 1981).

Previous chapters documented how maintaining a viable farm enterprise in a changing social and economic environment is becoming increasingly more difficult. For the individual, this may mean that he can never enter farming or must do so at a considerable price. For another, it may simply mean complete withdrawal from farming. To remain in agriculture, the farmer must produce more of a crop or a more valuable crop from the same land, from better land, or from more land. Consequently, there are now fewer farmers, with less land in agriculture and more intensive use of that which remains. The long-term and predominant social change in rural areas has been the graduation of the farmer from small-scale operator to rural technocrat. The farm has become a managed, corporate production unit increasingly more dependent on energy, technology, knowledge, and skills. The former character of rural areas is also now less well-defined as much of rural Canada is assimilated into the mainstream of Canadian society.

In the fringe and shadow of such urban centres as Edmonton, Vancouver, Winnipeg, Toronto, and Montreal, agriculture has come under increasing pressure from other land uses (Gierman, 1977; Warren and Rump, 1981; Manning and McCuaig, 1977; Simpson-Lewis, *et al.*, 1979). But it is these areas where the most intensive agricultural production is concentrated and where land-use conflicts are therefore greatest; loss of these lands from agriculture constitutes the greatest threat to regional and national agricultural productivity.

The major shifts in Canadian agriculture documented earlier in this paper have been accompanied by substantial social and economic changes in the affected regions. For regions like the Gaspé and northern New Brunswick, the decline of agriculture has meant loss of infrastructure, social services, and much of the economic base for the regions. While the physical land base may remain in a state where future farming may

be possible, the loss of the basic farming infrastructure and of expertise will make the return of farming to these areas unlikely (Beattie, *et al.*, 1981).

The result of the signficant westward shift of the nation's agricultural land base is an increasing dependence on land with lower overall quality, more severe climatic limitations (earlier frost, drought, wind), and greater susceptibility to salinization and organic material loss, thereby increasing the risk involved in an already hazardous and fluctuating business. The most climatically versatile and better quality lands of Ontario, Quebec, and British Columbia have already lost a significant amount of high capability agricultural land and are under increasing pressure from urban, industrial, and recreational uses (Warren and Rump, 1981). While more food may be produced, the nation's agricultural land base is clearly more susceptible to the vagaries of chance. "If significant areas of southern Ontario foodlands are lost to urban development, forestry, utilities and recreation, it will be necessary to bring more land into production, or become more dependent upon imported food. On northern lands, clearing, drainage and energy costs will be high, yields will be lower, and management flexibility will be less" (Ontario Energy and Agriculture Committee, 1981, 28).

Farming systems have become dependent on energy for fuel, mechanization, artificial fertilizers, etc. (the hazards of this dependence are obvious with the recent energy crisis) and thus have less flexibility and less assurance of future supplies. Even government programs that provide cushions through subsidies in floor prices and crop insurance have, to some extent, encouraged the taking of greater risks for short-term rewards (e.g., valuable but vulnerable crop varieties) and/or have insulated the farmer from the consequences of failure.

The nation has become increasingly more reliant on its best agricultural land resource, and some of that land is being lost through the expansion of non-agricultural activities. Consequently, the preservation and protection of the best agricultural lands must be seriously addressed as fundamental to the nation's food production. The trend is towards a continuing loss of parts of the nation's best land, with individuals, municipalities, and provincial governments deciding to release portions of this good land to urban and other uses through individual and local decisions. The argument is often that only a small part is lost. In a personal and local context this is true, but, as has been illustrated in this paper, each individual decision contributes to the national trend—a continuing loss of the best agricultural land. Each decision to remove land permanently or temporarily from agriculture means less farmland overall. The agricultural base is continuously getting smaller.

It is evident that the infrastructure necessary to support agriculture also relies on a critical amount of agricultural enterprise. In order to maintain production on the best agricultural land, the social and economic conditions must be right for individuals who wish to pursue agriculture. If the behaviour of landowners is the critical factor in land-use change, then it is the behaviour of landowners that must be influenced if one is to alter any of the trends we have documented. Successful renewable-resource production depends on the social and economic conditions that encourage landowners to *want* to make the most productive use of their land.

View of a cattle round-up in Alberta.
Ted Grant, NFB Phototheque

What is needed is not a freeze on development, but a serious commitment to consider agricultural land in development planning and to choose not to alienate

that land particularly where there are alternatives. This commitment must be made even if the alternatives have some added, one-time-only development costs. Until the future availability of land is given full consideration, individual and local economic decisions will continue to dictate the alienation of the best land from agriculture. Unfortunately, it seems that a crisis may be necessary before action is taken, and if a crisis occurs, it will be too late. No such crisis is imminent, but it is certainly predictable. Only *when* it will occur is in question. Our decisions today determine what (or even if) our children and grandchildren will eat. To quote from the 1981 Klinck lecture, "future generations will rightly condemn our generation for reprehensible, selfish, profligate misuse of Canada's most fundamentally important resource" (Bentley, 1981).

The nation's self-sufficiency in foodstuffs is threatened. By the year 2000, there will probably be 30 million Canadians. Canada traditionally imports food, including some varieties that we could produce on our better quality lands. While we have documented how, from the individual to the region to the nation, land-use decisions and problems accumulate, the argument can be taken one step further: Canada, too, contributes to world food production and agricultural land problems are a matter of global concern. The loss of farmland to desert and to urban development is occurring everywhere, and the burgeoning world population is concomitant with starvation and famine. Within this context, the value of good food-producing lands becomes even more important. Canada cannot afford anything less than the best possible stewardship of its agricultural land resource.

Epilogue: Solutions?

This paper has argued that the individual landowner is instrumental in what happens to the agricultural land resource of the nation. Through a better understanding of the factors that affect land-use decisions, it will be possible to influence those decisions. It is not enough to prohibit individuals from carrying out non-agricultural activities on their land (Manning and Eddy, 1978); they must also be encouraged to farm and to use good land-management practices. Preserving farmland is a useful first step, but someone must be willing or able to farm that land properly. An economic and social climate must be created where farming and good land management make sense to the owners and users of land.

While this paper has shown the flexibility of farmers in dealing rationally with changing circumstances in pursuit of survival, there seems to be an important role for governments in encouraging farmers. Measures to ensure economic stability through broad economic policies (interest rates, food pricing, energy) are important, as are marketing programs and trade and tariff policies, since they provide the confidence necessary to encourage wise long-term planning. Zoning, such as the *B.C. Agricultural Land Reserves* or *Quebec Bill 90*, also provides a measure of stability (Manning, 1979), encouraging long-term investment and better stewardship. Research to develop new techniques and better management procedures is also critical. Coordinated efforts by all levels of government will be required if Canadians are to assure some measure of their future food supply.

A small rural property in Lanark County, Ontario.
E.W. Manning

Appendices

APPENDIX A

Provincial Statistics

Rolling hills on the north shore of the St. Lawrence River in Les Eboulements, Quebec.
J.D. McCuaig

Appendix A

Area of total farmland, by province, 1921 to 1976

Province	Area of farmland									Farms Producing over $1,200 1976	Absolute Change 1961-76	Percent Change 1961-76
	1921	1931	1941	1951	1956	1961	1966	1971	1976			
					(ha)							
Newfoundland				34,416	29,063	22,081	20,038	25,376	32,400	29,423	+10,319	+46.7
Prince Edward Island	492,311	482,079	473,041	443,270	431,193	388,576	375,148	313,493	295,850	278,050	-92,726	-23.9
Nova Scotia	1,911,621	1,741,032	1,544,597	1,284,393	1,123,302	902,641	749,462	537,796	493,310	400,249	-409,331	-45.3
New Brunswick	1,727,891	1,680,151	1,604,275	1,404,404	1,206,592	890,208	733,193	541,947	466,796	402,328	-423,412	-47.6
Québec	6,983,913	7,002,995	7,309,920	6,793,458	6,438,829	5,746,130	5,214,992	4,371,212	4,009,087	3,654,134	-1,737,043	-30.2
Ontario	9,157,916	9,243,711	9,060,416	8,450,158	8,045,293	7,518,722	7,214,200	6,460,249	6,261,928	5,966,816	-1,256,794	-16.7
Manitoba	5,915,032	6,123,793	6,835,918	7,175,490	7,257,006	7,353,379	7,723,221	7,692,642	7,699,925	7,610,995	+346,546	+4.7
Saskatchewan	17,816,070	22,531,049	24,266,187	24,955,095	25,412,723	26,068,960	26,471,169	26,328,517	26,512,476	26,432,628	+443,516	+1.7
Alberta	11,854,899	15,774,177	17,514,321	17,992,813	18,604,219	19,113,436	19,823,370	20,035,194	20,206,174	20,039,981	-1,092,738	+ 5.7
British Columbia	1,157,682	1,433,262	1,632,386	1,903,010	1,836,885	1,823,802	2,141,798	2,356,662	2,449,613	2,351,802	+625,811	+34.3
Yukon and Northwest Territories	656	2,103	1,125	175	1,812	3,476	1,727	1,800	1,879	1,796	-1,597	-45.9
Canada	57,017,991	66,014,352	70,242,186	70,436,682	70,386,917	69,831,411	70,468,318	68,664,888	68,429,438	67,168,202	-1,401,973	-2.0

Sources: Simpson-Lewis, W. et al. 1979. Canada's Special Resource Lands: A National Perspective of Selected Land Uses. Map Folio No. 4. Lands Directorate, Environment Canada. Ottawa.
Statistics Canada. Special runs for census farms over 0.4 hectares in size for 1976 figures.

Area of improved farmland, by province, 1921 to 1976

Province	Area of improved farmland									Farms Producing over $1,200 1976	Absolute Change 1961-76	Percent Change 1961-76
	1921	1931	1941	1951	1956	1961	1966	1971	1976			
	(ha)											
Newfoundland				11,729	9,807	8,278	8,323	7,749	11,139	9,755	+2,861	+34.6
Prince Edward Island	310,534	309,908	298,426	234,353	261,231	234,547	230,598	199,975	203,790	194,147	-30,757	-13.1
Nova Scotia	401,651	341,823	328,779	267,901	254,910	201,347	196,627	156,223	168,682	147,853	-32,665	-16.2
New Brunswick	553,639	538,345	499,979	407,281	384,987	297,093	258,461	197,243	188,725	171,844	-108,368	-36.5
Québec	3,668,464	3,639,936	3,667,663	3,573,083	3,492,494	3,182,632	3,087,596	2,610,312	2,396,884	2,245,347	-785,748	-24.5
Ontario	5,329,640	5,371,577	5,408,152	5,136,958	5,087,952	4,869,724	4,858,142	4,396,904	4,479,763	4,333,292	-389,961	-8.0
Manitoba	3,261,001	3,448,825	3,977,867	4,355,305	4,635,346	4,841,828	5,036,923	5,181,774	5,216,916	5,181,499	+375,088	+7.7
Saskatchewan	10,132,636	13,577,275	14,398,141	15,705,100	16,392,778	17,449,779	18,401,214	18,788,799	18,929,645	18,895,957	+1,479,866	+8.5
Alberta	4,762,527	7,182,825	8,144,677	9,013,092	9,610,052	10,234,267	11,038,699	11,517,895	11,858,597	11,790,925	+1,624,330	+15.9
British Columbia	220,345	285,296	361,431	464,505	472,185	527,431	653,243	710,348	773,477	736,237	+246,046	+46.6
Yukon and Northwest Territories	192	460	425	32	288	440	251	629	603	576	+163	+37.1
CANADA	28,640,629	34,696,270	37,085,540	39,196,339	40,602,030	41,847,366	43,770,077	43,767,851	44,228,221	43,707,432	+2,380,855	+5.7

Sources: Simpson-Lewis, W. et al. 1979. Canada's Special Resource Lands: A National Perspective of Selected Land Uses. Map Folio No. 4. Lands Directorate, Environment Canada. Ottawa.
Statistics Canada. Special runs for census farms over 0.4 hectares in size for 1976 figures.

Number of census farms, by province, 1921 to 1976

Province	Number of census-farms									Farms Producing over $1,200 1976	Absolute Change 1961-76	Percent Change 1961-76
	1921	1931	1941	1951	1956	1961	1966	1971	1976			
Newfoundland				3,626	2,387	1,752	1,709	1,042	878	398	-874	-49.9
Prince Edward Island	13,701	12,865	12,230	10,137	9,432	7,335	6,357	4,543	3,677	3,054	-3,658	-49.8
Nova Scotia	47,432	39,444	32,977	23,515	21,075	12,518	9,621	6,008	5,434	3,441	-7,084	-56.6
New Brunswick	36,655	34,025	31,889	26,431	22,116	11,786	8,706	5,485	4,551	3,244	-7,235	-61.4
Québec	137,619	135,957	154,669	134,336	122,617	95,777	80,294	61,257	51,587	43,097	-44,190	-46.1
Ontario	198,053	192,174	178,204	149,920	140,602	121,333	109,887	94,722	88,801	76,983	-32,532	-26.8
Manitoba	53,252	54,199	58,024	52,383	49,201	43,306	39,747	34,981	32,104	29,963	-11,202	-25.9
Saskatchewan	119,451	136,472	138,713	112,018	103,391	93,924	85,686	76,970	70,958	69,578	-22,966	-24.5
Alberta	82,954	97,408	99,732	84,315	79,424	73,212	69,411	62,702	61,130	57,310	-12,082	-16.5
British Columbia	21,973	26,079	26,394	26,406	24,748	19,934	19,085	18,400	19,432	13,033	-502	-2.5
Yukon and Northwest Territories	10	41	26	4	22	26	19	18	26	17	0	0
CANADA	711,090	728,623	732,832	623,091	575,015	480,903	430,522	366,128	338,578	300,118	-142,325	-29.6

Sources: Simpson-Lewis, W. et al. 1979. Canada's Special Resource Lands: A National Perspective of Selected Land Uses. Map Folio No. 4. Lands Directorate, Environment Canada. Ottawa.
Statistics Canada. Special runs for census farms over 0.4 hectares in size for 1976 figures.

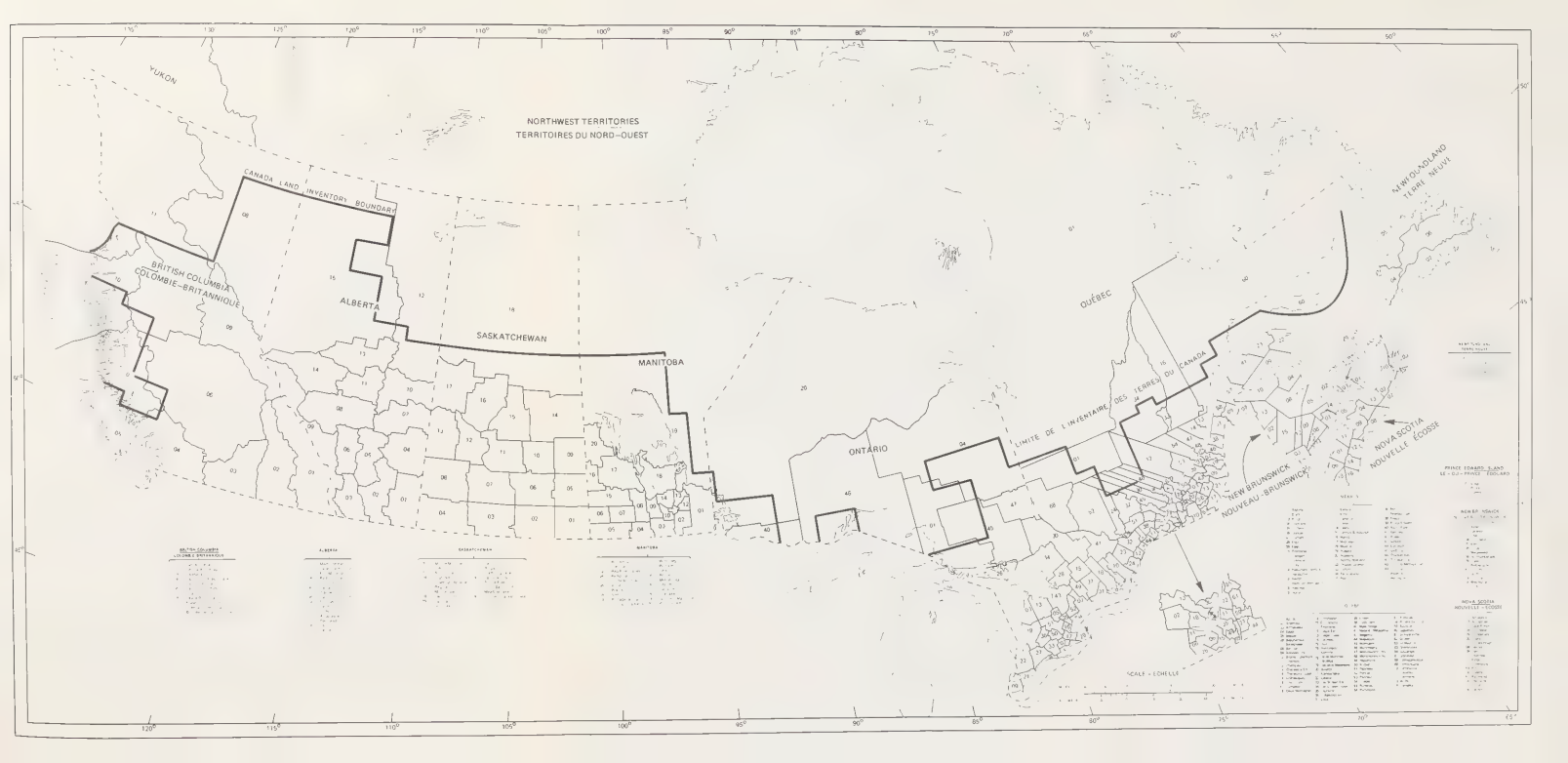
Average census-farm size, by province, 1921 to 1976

Province	Average farm size									Farms producing over $1,200 1976	Absolute Change 1961-76	Percent Change 1961-76
	1921	1931	1941	1951	1956	1961	1966	1971	1976			
	(ha)											
Newfoundland				9	12	13	12	24	37	74	+24	+184.6
Prince Edward Island	36	38	39	44	46	53	59	69	80	91	+27	+50.9
Nova Scotia	40	44	47	55	53	72	78	89	91	116	+19	+26.4
New Brunswick	47	49	50	53	55	76	84	99	103	124	+27	+35.5
Québec	51	51	47	51	53	60	65	71	78	85	+18	+30.0
Ontario	46	48	51	56	57	62	66	68	71	78	+9	+14.5
Manitoba	111	113	118	137	147	170	194	220	240	254	+70	+41.2
Saskatchewan	149	165	175	223	246	278	309	342	374	380	+96	+34.5
Alberta	143	162	176	213	234	261	286	320	331	350	+70	+26.8
British Columbia	53	55	62	72	74	91	112	128	126	180	+35	+38.5
Yukon and Northwest Territories	66	51	43	44	82	134	91	100	72	106	-62	-46.3
CANADA	80	91	96	113	122	145	163	187	202	224	+57	+39.3

Sources: Simpson-Lewis, W. et al. 1979. Canada's Special Resource Lands: A National Perspective of Selected Land Uses. Map Folio No. 4. Lands Directorate, Environment Canada. Ottawa.
Statistics Canada. Special runs for census farms over 0.4 hectares in size for 1976 figures.

APPENDIX B

Standard Census Divisions, 1961-1976


YUKON
NORTHWEST TERRITORIES
TERRITOIRES DU NORD-OUEST
CANADA LAND INVENTORY BOUNDARY
BRITISH COLUMBIA
COLOMBIE-BRITANNIQUE
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUÉBEC
LIMITE DE L'INVENTAIRE DES TERRES DU CANADA
NEWFOUNDLAND
TERRE-NEUVE
NOVA SCOTIA
NOUVELLE-ÉCOSSE
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
PRINCE EDWARD ISLAND
LE-DU-PRINCE-ÉDOUARD
SCALE - ÉCHELLE

APPENDIX C

STUDY METHODOLOGY: THE NATIONAL DATA SET

Because of variations between censuses, a uniform set of boundaries, similar to Census Districts (CDs), was developed. These Standard Census Divisions (SCDs) could then be used for accurate time-series analysis on changes documented in census data. The time period selected was from 1961 to 1976, because this was when most change occurred in Canadian agriculture, the census boundaries were radically altered after 1956, and the reliability of the 1956 census was not good (Statistics Canada personnel). The 1976 boundaries were used as the base through which adjustments could be made, since many of the boundary changes from 1961 to 1976 were rationalizations and eliminations. It will also be easier to add 1981 data when it becomes available.

To create consistent units, the 1976 boundaries were compared with those of 1961. If the boundaries were identical, they were cross-checked to ensure that no interim changes were made and then reversed. After this, the area could be recorded as not having changed and census figures for that area could be accepted as published. If the 1961 and 1976 boundaries differed, all four years were checked to find when and how changes were accomplished. Most changes were either a deletion or addition of all or part of a Census Subdivision (CSD). Changes were recorded and carried through the four years.

Radical changes in boundaries in B.C. and Newfoundland required the formation of uniform areas from CSDs or municipal units to allow consistency over the four censuses. As a result, there are 11 areas in B.C., only three of which resemble the 1976 boundaries. The pattern here follows most closely the 1961 boundaries. Relatively consistent reporting units were created in Newfoundland by combining present areas, with only the Avalon Peninsula and Cornerbrook remaining intact. Labrador was ignored because either no farms reported or population was minimal.

Once consistent units were achieved, a series of 229 cards for each SCD was gathered. Instructions on which CSDs should be added or subtracted from the published data were indicated on the card for each SCD. A special run for all farms with $50 or more of production was obtained from Statistics Canada for all four census years, since the 1976 published data was only for farms with over $1,200 production. The provincial totals for each variable also had to be double-checked to ensure the calculations were correct after all the alterations had been made.

Calculating the variables from the published data had to be done by hand (an automated process is expected for 1983). Because of the volume of data, only number of farms, total area in farms, total improved land, and value of land and buildings were recorded from the four census years. The result was a data matrix of 229 regions with 16 variables for each. The SPSS program was used to analyse the matrix, because it is widely available and was most suitable for the analysis required.

Data from two non-census sources were then added to the system for further analysis. The first was the Canada Land Inventory Agricultural Capability Classification (CLI). The CLI is reported in 1976 census units and was added in the form of nine variables that recorded the area in each of the Capability Classes 1-7, organic soils, and unclassed. Only three of the 11 areas in British Columbia were classified and no CLI data was available for Newfoundland. Because the CLI does not cover all of northern Canada, the boundaries being chosen to include known and potential agricultural areas, it was assumed that reporting census farms in the north were actually covered by the CLI. Therefore, reported figures from some northern areas were not adjusted or calculated with CLI data. The CLI boundary is indicated on the maps.

The second source of additional data was the Agro-Climatic Resource Index (ACRI), which also reported in census districts. B.C. and Newfoundland had to be interpreted to obtain a representative index. All 229 SCDs have an ACRI number.

The complete system, in raw form (26 variables) or in SPSS System File Form (130+ variables and derived variables), is available on a cost recovery basis from the Lands Directorate, Environment Canada, Ottawa, K1A 0E7.

THE CANADA LAND DATA SYSTEM AND THE SAUGEEN RIVER BASIN

Contributed by W.A. Switzer
Chief, Canada Land Data System
October, 1981

The Canada Land Data System (CLDS) is a computerized information system that handles (spatial) resource information. The system can manipulate and produce data in various forms that facilitate effective land-use planning and resource management. The system through its main software component, the Canada Geographic Information System (CGIS), stores, manipulates, analyses, and provides access to physical, biological, social, and economic data on Canada's resources.

The system has a data base in excess of 4,000 digital maps that include: the Canada Land Inventory which details the land capability for forestry, agriculture, recreation, and wildlife waterfowl and ungulates for most of the settled areas of Canada; land-use maps; census enumeration areas; watershed boundaries; data on federal land holdings; and scores of specialized data sets for a variety of clients.

The system is used primarily by Environment Canada and other federal government agencies. Some provincial agencies, crown corporations, and universities are also users. The system is being applied in such areas as land-use planning and monitoring, federal land management, defining areas of conflict between competing resource uses, and park planning and management.

On input, the CGIS software converts the data into the data base quickly, accurately, and at a relatively low cost, using one of several digitizing procedures. The data is generally scanned with a map scanner. However, for low-density maps (i.e., with few areas), manual or hand digitizing is used to convert the analog or map information to a digital image. Both the image of the maps and the attribute or descriptive data associated with the map elements are stored by the system in a single integrated data base.

To produce large geographical area data bases, maps can be joined. The system allows: a comparison of maps of different scales; the definition of study areas with significant flexibility; the retrieval of data for user-defined study areas; the calculation of the area and/or perimeter of map units; and the comparison of data for any area by overlaying sets of information.

On output, the system provides the data either in tabular or map form. Maps are produced at the required scale usually as black and white line maps. Colour maps are now being used more frequently as well. The data is available for direct input to commercially available packages for further manipulation. The most common form of output has been IGSS (Interactive Graphics Subsystem) data bases that are accessed from remote terminals to produce maps and tables on a CRT screen. Tabular reports not available to the IGSS have also been produced for many users.

Training is provided to users of the IGSS by CLDS personnel. It generally takes about half a day to learn and understand the system, followed by a day to a day-and-a-half hands-on experience.

For the Saugeen River Basin, the system was applied for examination of changes in land use. The project involved both the entry and the retrieval of land-use data. Five 1:50,000 1952 land-use maps, eleven 1:50,000 Canada Land Inventory land-use maps 1966, and eleven 1:50,000 1976 land-use maps were entered. The latter also included shoreline and township boundaries. Standard procedures were used for data entry. The three sets of data were overlaid (i.e., mathematically superimposed by computer software) to create a composite data base ready for analysis.

From the data base, a derivative or second data base suitable for retrieval was created through the Interactive Graphics Subsystem (IGSS). Tabular reports were generated by the project manager using the simple English commands of the IGSS. Large-scale plots (maps) were created in a similar manner with a large digital plotter for output. The tables and maps indicated the extent, degree, nature, and location of the changes in land use between 1952 and 1966, and between 1966 and 1976.

The project was extended with the entry of eleven 1:50,000 Canada Land Inventory agricultural capability maps. This data was overlaid on the previously created land-use overlay (1952,1966,1976), producing another data base suitable for use by the IGSS software. The Census of Agriculture information was linked to the townships creating a comprehensive, physical, and socio-economic data base for analysis. The interactive retrieval capabilities (IGSS) were used to query this complex data base for the tabular reports and maps in Chapter Four. All operations were performed with standard software as part of the CGIS package.

Access to the data base can be provided from any location where communications and a terminal are available. The Lands Directorate provides terminals in its regional offices in Halifax, Quebec City, and Burlington and has one terminal on loan for short periods of time.

APPENDIX C

Agricultural Change Data by SCD*
1961-1976

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
Newfoundland				
101 Avalon	- 503 (- 52)	+ 10,641 (+ 126)	+ 1,589 (+ 38)	+ 26.8 (+ 207)
102 Southern Newfoundland	- 24 (- 35)	+ 172 (+ 61)	+ 93 (+ 49)	+ 1.0 (+ 339)
104 Corner Brook	- 201 (- 64)	- 5,048 (- 51)	- 328 (- 14)	+ 3.4 (+ 143)
105 Northern Newfoundland	- 47 (- 23)	3,020 (+ 140)	+ 960 (+ 96)	+ 6.0 (+ 327)
106 Grand Falls Gander	- 99 (- 49)	1,530 (+ 114)	+ 544 (+ 88)	+ 2.6 (+ 169)
Prince Edward Island				
201 Kings	- 964 (- 59)	- 32,211 (- 33)	- 6,409 (- 15)	+ 28.2 (+ 336)
202 Prince	- 1,412 (- 53)	- 33,178 (- 24)	- 11,970 (- 13)	+ 54.5 (+ 268)
203 Queens	- 1,282 (- 42)	- 27,305 (- 18)	- 12,367 (- 12)	+ 83.0 (+ 349)
Nova Scotia				
301 Annapolis	- 370 (- 42)	- 23,293 (- 36)	- 257 (- 2)	+ 20.4 (+ 293)
302 Antigonish	- 432 (- 63)	- 21,669 (- 42)	- 1,011 (- 10)	+ 10.4 (+ 263)
303 Cape Breton	- 275 (- 66)	- 12,863 (- 60)	- 1,554 (- 37)	+ 6.7 (+ 197)
304 Colchester	- 596 (- 51)	- 46,411 (- 44)	- 3,716 (- 15)	+ 26.3 (+ 283)
305 Cumberland	- 640 (- 52)	- 32,440 (- 31)	- 5,849 (- 19)	+ 24.8 (+ 363)
306 Digby	- 377 (- 67)	- 17,264 (- 58)	- 2,061 (- 48)	+ 3.7 (+ 116)
307 Guysborough	- 293 (- 79)	- 24,298 (- 74)	- 1,797 (- 54)	+ 1.0 (+ 78)
308 Halifax	- 202 (- 46)	- 16,143 (- 43)	- 294 (- 4)	+ 10.7 (+ 190)
309 Hants	- 431 (- 47)	- 31,950 (- 38)	- 1,012 (- 5)	+ 27.7 (+ 332)
310 Inverness	- 820 (- 78)	- 48,625 (- 69)	- 4,579 (- 43)	+ 4.1 (+ 65)
311 Kings	- 506 (- 39)	- 16,636 (- 20)	- 1,127 (+ 4)	+ 56.0 (+ 382)
312 Lunenburg	- 723 (- 61)	- 37,924 (- 54)	- 2,990 (- 34)	+ 14.7 (+ 215)

* SCD as defined in Chapter 2.

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
313 Pictou	- 587 (- 51)	- 32,081 (- 42)	- 5,192 (- 24)	+ 18.6 (+ 318)
314 Queens	- 78 (- 56)	- 6,528 (- 54)	- 31 (- 3)	+ 0.6 (+ 55)
315 Richmond	- 213 (- 86)	- 9,513 (- 78)	- 532 (- 42)	+ 0.3 (+ 30)
316 Shelburne	- 56 (- 62)	- 5,232 (- 77)	- 218 (- 61)	+ 0.2 (+ 39)
317 Victoria	- 208 (- 79)	- 15,121 (- 73)	- 1,653 (- 59)	+ 1.0 (+ 59)
318 Yarmouth	- 277 (- 64)	- 11,198 (- 54)	- 1,024 (- 28)	+ 4.6 (+ 192)
New Brunswick				
401 Albert	- 150 (- 50)	- 12,356 (- 46)	- 2,882 (- 36)	+ 5.3 (+ 238)
402 Carleton	- 599 (- 44)	- 30,223 (- 25)	- 10,200 (- 19)	+ 27.5 (+ 264)
403 Charlotte	- 165 (- 58)	- 13,319 (- 56)	- 1,333 (- 34)	+ 2.4 (+ 97)
404 Gloucester	- 865 (- 80)	- 32,967 (- 66)	- 8,637 (- 54)	+ 3.3 (+ 43)
405 Kent	- 807 (- 73)	- 45,450 (- 63)	- 15,643 (- 61)	+ 6.2 (+ 130)
406 Kings	- 677 (- 50)	- 51,095 (- 43)	- 10,169 (- 30)	+ 26.9 (+ 297)
407 Madawaska	- 595 (- 69)	- 36,862 (- 54)	- 12,702 (- 45)	+ 7.9 (+ 105)
408 Northumberland	- 707 (- 79)	- 33,811 (- 76)	- 5,610 (- 60)	+ 1.5 (+ 28)
409 Queens	- 268 (- 56)	- 17,925 (- 41)	- 2,822 (- 30)	+ 5.9 (+ 147)
410 Restigouche	- 391 (- 77)	- 19,542 (- 61)	- 7,437 (- 54)	+ 1.7 (+ 44)
411 St. John	- 85 (- 79)	- 5,551 (- 74)	- 933 (- 68)	- 0.4 (- 20)
412 Sunbury	- 143 (- 52)	- 12,598 (- 49)	- 2,178 (- 38)	+ 5.4 (+ 212)
413 Victoria	- 296 (- 42)	- 11,914 (- 23)	- 3,308 (- 15)	+ 13.3 (+ 149)
414 Westmorland	- 857 (- 62)	- 46,409 (- 46)	- 14,504 (- 37)	+ 17.8 (+ 180)
415 York	- 630 (- 57)	- 53,247 (- 51)	- 9,966 (- 39)	+ 17.6 (+ 186)
Quebec				
501 Abitibi	- 2,308 (- 67)	- 79,699 (- 34)	- 29,642 (- 27)	+ 10.2 (+ 50)
502 Argenteuil	- 231 (- 37)	- 17,914 (- 35)	- 9,744 (- 36)	+ 16.9 (+ 148)

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
503 Athabaska	- 797 (- 40)	- 35,411 (- 24)	- 18,042 (- 20)	+ 37.0 (+ 178)
504 Bagot	- 660 (- 36)	- 15,116 (- 17)	- 9,883 (- 14)	+ 68.1 (+ 334)
505 Beauce	- 1,553 (- 42)	- 50,225 (- 24)	- 34,986 (- 31)	+ 35.4 (+ 116)
506 Beauharnois	- 227 (- 36)	- 1,521 (- 6)	- 1,712 (- 8)	+ 19.3 (+ 200)
507 Bellechase	- 974 (- 49)	- 37,542 (- 35)	- 13,898 (- 26)	+ 27.7 (+ 164)
508 Berthier	- 477 (- 37)	- 16,728 (- 26)	- 6,385 (- 16)	+ 29.9 (+ 213)
509 Bonaventure	- 1,337 (- 70)	- 54,467 (- 53)	- 18,827 (- 48)	+ 4.3 (+ 34)
510 Brome/Shefford	- 1,211 (- 43)	- 79,510 (- 39)	- 37,260 (- 38)	+ 74.5 (+ 216)
511 Chambly	- 196 (- 61)	- 9,724 (- 55)	- 8,757 (- 54)	+ 10.7 (+ 182)
512 Champlain	- 953 (- 45)	- 31,078 (- 28)	- 14,207 (- 23)	+ 22.5 (+ 112)
513 Charlevoix-Est	- 207 (- 50)	- 9,940 (- 35)	- 4,683 (- 36)	+ 5.1 (+ 142)
514 Charlevoix-Ouest	- 339 (- 53)	- 15,567 (- 40)	- 7,099 (- 40)	+ 4.3 (+ 87)
515 Châteauguay	- 315 (- 30)	- 7,055 (- 14)	- 4,483 (- 11)	+ 42.3 (+ 224)
516 Chicoutimi	- 769 (- 55)	- 42,315 (- 39)	- 19,649 (- 35)	+ 11.7 (+ 54)
517 Compton	- 697 (- 45)	- 32,555 (- 26)	- 10,874 (- 22)	+ 33.3 (+ 228)
518 Deux-Montagnes	- 520 (- 38)	- 15,130 (- 28)	- 9,368 (- 23)	+ 42.8 (+ 165)
519 Dorchester	- 1,388 (- 49)	- 54,141 (- 36)	- 26,635 (- 34)	+ 38.7 (+ 176)
520 Drummond	- 744 (- 41)	- 35,471 (- 30)	- 17,424 (- 24)	+ 38.7 (+ 245)
521 Frontenac	- 1,092 (- 56)	- 44,920 (- 33)	- 18,581 (- 33)	+ 11.7 (+ 76)
522 Gaspé-Est	- 562 (- 84)	- 12,497 (- 73)	- 4,431 (- 67)	- 0.8 (- 18)
523 Gaspé-Ouest	- 292 (- 74)	- 14,274 (- 65)	- 5,659 (- 64)	- 0.9 (- 26)
524 Gatineau	- 636 (- 55)	- 51,594 (- 44)	- 16,275 (- 38)	+ 22.4 (+ 187)
525 Hull	- 140 (- 64)	- 8,778 (- 60)	- 5,169 (- 58)	+ 5.7 (+ 169)
526 Huntingdon	- 331 (- 28)	- 13,272 (- 17)	- 4,900 (- 11)	+ 51.9 (+ 297)
527 Iberville	- 251 (- 30)	- 4,461 (- 11)	- 5,186 (- 14)	+ 39.9 (+ 297)

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
528 Ile-de-Montréal	- 282 (- 40)	- 7,467 (- 45)	- 6,123 (- 45)	+ 21.3 (+ 103)
529 Iles-de-la-Madeleine	- 57 (- 26)	- 845 (- 36)	- 777 (- 50)	+ 1.6 (+ 126)
530 Joliette	- 522 (- 35)	- 22,936 (- 32)	- 12,508 (- 26)	+ 39.0 (+ 224)
531 Kamouraska	- 838 (- 52)	- 30,407 (- 34)	- 9,707 (- 20)	+ 11.7 (+ 77)
532 Labelle	- 605 (- 53)	- 35,361 (- 38)	- 15,103 (- 39)	+ 10.0 (+ 110)
533 Lac-St-Jean-Est	- 374 (- 40)	- 11,755 (- 19)	- 5,068 (- 12)	+ 16.3 (+ 114)
534 Lac-St-Jean-Ouest	- 1,092 (- 54)	- 35,522 (- 25)	- 11,876 (- 15)	+ 15.3 (+ 71)
535 Laprairie	- 230 (- 37)	- 6,935 (- 24)	- 6,300 (- 23)	+ 19.1 (+ 204)
536 L'Assomption	- 317 (- 28)	- 13,668 (- 28)	- 8,775 (- 23)	+ 29.7 (+ 165)
537 Lévis	- 373 (- 43)	- 15,465 (- 35)	- 6,521 (- 24)	+ 23.0 (+ 210)
538 L'Islet	- 785 (- 56)	- 37,671 (- 42)	- 11,569 (- 32)	+ 7.3 (+ 67)
539 Lotbinière	- 1,054 (- 41)	- 21,748 (- 18)	- 6,015 (- 9)	+ 42.7 (+ 211)
540 Maskinongé	- 303 (- 30)	- 10,839 (- 22)	- 6,911 (- 20)	+ 17.2 (+ 156)
541 Matane/Matapedia	- 1,844 (- 63)	- 64,526 (- 33)	- 22,751 (- 25)	+ 14.1 (+ 76)
543 Mégantic	- 709 (- 37)	- 24,897 (- 18)	- 14,428 (- 21)	+ 22.8 (+ 119)
544 Missisquoi	- 403 (- 33)	- 13,209 (- 16)	- 7,531 (- 15)	+ 51.4 (+ 269)
545 Montcalm	- 357 (- 36)	- 10,833 (- 29)	- 3,917 (- 16)	+ 21.7 (+ 174)
546 Montmagny	- 707 (- 58)	- 37,611 (- 52)	- 11,529 (- 38)	+ 6.8 (+ 58)
547 Montmorency No. 1	- 255 (- 57)	- 17,417 (- 53)	- 5,585 (- 48)	+ 5.0 (+ 85)
548 Montmorency No. 2	- 89 (- 23)	- 3,963 (- 22)	- 3,026 (- 26)	+ 10.4 (+ 201)
549 Napierville	- 177 (- 20)	- 1,964 (- 5)	- 1,140 (- 4)	+ 36.7 (+ 309)
550 Nicolet	- 1,186 (- 44)	- 37,543 (- 26)	- 24,080 (- 24)	+ 40.2 (+ 188)
551 Papineau	- 655 (- 45)	- 36,645 (- 33)	- 16,852 (- 30)	+ 30.5 (+ 228)
552 Pontiac	- 480 (- 37)	- 31,106 (- 27)	- 12,667 (- 21)	+ 37.1 (+ 276)
553 Portneuf	- 943 (- 48)	- 44,988 (- 37)	- 16,531 (- 27)	+ 29.0 (+ 148)
554 Québec	- 251 (- 49)	- 9,899 (- 50)	- 4,488 (- 46)	+ 11.4 (+ 129)

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
555 Richelieu	- 388 (- 44)	- 8,343 (- 23)	- 7,467 (- 25)	+ 18.1 (+ 201)
556 Richmond	- 561 (- 43)	- 26,214 (- 29)	- 11,841 (- 27)	+ 24.2 (+ 191)
557 Rimouski	- 1,176 (- 53)	- 41,502 (- 28)	- 13,229 (- 18)	+ 15.3 (+ 83)
558 Rivière-du-Loup	- 923 (- 49)	- 33,907 (- 25)	- 14,216 (- 20)	+ 13.7 (+ 75)
559 Rouville	- 325 (- 25)	- 5,140 (- 10)	- 4,795 (- 11)	+ 57.3 (+ 254)
560 Saguenay	- 132 (- 60)	- 4,534 (- 27)	- 579 (- 9)	+ 1.9 (+ 99)
561 St-Hyacinthe	- 413 (- 30)	- 5,502 (- 9)	- 1,731 (- 3)	+ 73.5 (+ 372)
562 St-Jean	- 231 (- 35)	- 8,497 (- 23)	- 6,899 (- 22)	+ 26.1 (+ 244)
563 St-Maurice	- 544 (- 49)	- 25,570 (- 49)	- 15,520 (- 44)	+ 13.5 (+ 119)
565 Sherbrooke	- 290 (- 52)	- 13,548 (- 43)	- 7,265 (- 44)	+ 10.3 (+ 124)
566 Soulanges	- 207 (- 33)	- 6,244 (- 21)	- 5,131 (- 19)	+ 21.3 (+ 262)
567 Stanstead	- 517 (- 45)	- 24,794 (- 29)	- 7,141 (- 19)	+ 28.0 (+ 221)
568 Temiscaminque	- 1,107 (- 62)	- 23,595 (- 19)	- 7,719 (- 12)	+ 8.8 (+ 72)
569 Temiscouata	- 1,040 (- 71)	- 40,870 (- 42)	- 14,999 (- 40)	+ 3.5 (+ 43)
570 Terrebonne	- 466 (- 53)	- 25,279 (- 57)	- 13,103 (- 54)	+ 10.0 (+ 62)
571 Vaudreuil	- 248 (- 35)	- 6,882 (- 20)	- 4,824 (- 18)	+ 28.6 (+ 296)
572 Verchères	- 370 (- 41)	- 13,870 (- 31)	- 10,868 (- 29)	+ 22.3 (+ 167)
573 Wolfe	- 701 (- 52)	- 36,448 (- 34)	- 15,961 (- 34)	+ 14.2 (+ 135)
574 Yamaska	- 456 (- 30)	- 9,585 (- 12)	- 6,635 (- 11)	+ 37.5 (+ 239)
Ontario				
601 Algoma	- 211 (- 30)	- 20,613 (- 30)	- 4,221 (- 16)	+ 22.3 (+ 251)
602 Brant	- 399 (- 23)	- 6,411 (- 8)	- 1,269 (- 2)	+ 212.1 (+ 333)
603 Bruce	- 1,052 (- 25)	- 32,207 (- 11)	- 5,869 (- 3)	+ 318.1 (+ 533)
604 Cochrane	- 531 (- 59)	- 26,570 (- 35)	- 9,899 (- 30)	+ 13.3 (+ 162)
605 Dufferin	- 622 (- 33)	- 26,735 (- 22)	- 17,871 (- 19)	+ 180.9 (+ 539)

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
606 Dundas	- 442 (- 28)	- 8,181 (- 10)	- 4,710 (- 7)	+ 81.5 (+ 440)
607 Durham	- 677 (- 20)	- 29,843 (- 16)	- 15,302 (- 12)	+ 525.4 (+ 577)
608 Elgin	- 723 (- 23)	- 4,808 (- 3)	- 4,243 (+ 3)	+ 362.1 (+ 368)
609 Essex	- 1,321 (- 27)	- 9,462 (- 6)	- 3,033 (- 2)	+ 399.1 (+ 295)
610 Frontenac	- 513 (- 32)	- 42,774 (- 28)	- 11,036 (- 18)	+ 77.8 (+ 421)
611 Glengarry	- 573 (- 35)	- 23,097 (- 22)	- 10,749 (- 16)	+ 67.5 (+ 392)
612 Glenville	- 329 (- 29)	- 18,704 (- 24)	- 5,217 (- 13)	+ 59.2 (+ 439)
613 Grey	- 1,554 (- 28)	- 70,920 (- 19)	- 27,982 (- 12)	+ 350.8 (+ 490)
614 Haldimand-Norfolk	- 1,362 (- 25)	- 22,330 (- 9)	- 12,333 (- 6)	+ 614.4 (+ 295)
615 Haliburton	- 97 (- 43)	- 13,288 (- 58)	- 3,488 (- 61)	+ 5.8 (+ 291)
616 Halton	- 303 (- 23)	- 15,165 (- 23)	- 9,533 (- 19)	+ 283.8 (+ 505)
617 Hamilton-Wentworth	- 671 (- 28)	- 13,879 (- 17)	- 7,686 (- 12)	+ 265.9 (+ 394)
618 Hastings	- 882 (- 34)	- 69,856 (- 31)	- 15,427 (- 17)	+ 121.2 (+ 447)
619 Huron	- 1,072 (- 21)	- 11,557 (- 4)	+ 800 (0)	+ 526.4 (+ 624)
620 Kenora	- 100 (- 42)	- 9,205 (- 31)	- 516 (- 5)	+ 7.5 (+ 277)
621 Kent	- 1,338 (- 28)	- 2,405 (- 1)	+ 9,582 (+ 5)	+ 493.7 (+ 348)
622 Lambton	- 812 (- 19)	- 9,642 (- 4)	+ 5,675 (+ 3)	+ 467.4 (+ 605)
623 Lanark	- 462 (- 25)	- 53,353 (- 27)	- 6,125 (- 9)	+ 105.3 (+ 558)
624 Leeds	- 636 (- 33)	- 36,084 (- 23)	- 5,167 (- 8)	+ 81.4 (+ 389)
625 Lennox and Addington	- 465 (- 30)	- 24,495 (- 19)	- 8,389 (- 13)	+ 73.7 (+ 395)
626 Manitoulin	- 298 (- 41)	- 16,722 (- 15)	- 1,203 (- 5)	+ 19.8 (+ 285)
627 Middlesex	- 1,094 (- 22)	- 18,953 (- 7)	+ 7,910 (+ 4)	+ 618.9 (+ 533)
628 Muskoka	- 187 (- 48)	- 21,013 (- 56)	- 4,952 (- 47)	+ 13.1 (+ 286)
629 Niagara	- 1,014 (- 21)	- 19,397 (- 16)	- 11,604 (- 12)	+ 449.7 (+ 352)
630 Nipissing	- 291 (- 36)	- 23,791 (- 29)	- 5,571 (- 18)	+ 27.6 (+ 342)

Census Division	Change in Number of Farms Absolute (ha)	(Percentage)	Change in Farmland Absolute (ha)	(Percentage)	Change in Improved Land Absolute (ha)	(Percentage)	Change in Value of Land and Buildings Absolute (in millions $)	(Percentage)
631 Northumberland	- 636	(- 25)	- 28,664	(- 18)	- 10,636	(- 11)	+ 208.4	(+ 469)
632 Ottawa-Carleton	- 710	(- 26)	- 46,362	(- 24)	- 25,773	(- 20)	+ 224.8	(+ 313)
633 Oxford	- 834	(- 22)	- 6,537	(- 4)	- 1,642	(+ 1)	+ 463.4	(+ 444)
634 Parry Sound	- 305	(- 36)	- 41,779	(- 41)	- 5,179	(- 21)	+ 23.5	(+ 281)
635 Peel	- 513	(- 33)	- 21,209	(- 25)	- 17,234	(- 25)	+ 325.1	(+ 418)
636 Perth	- 852	(- 21)	- 6,290	(- 3)	- 2,416	(- 1)	+ 429.3	(+ 562)
637 Peterborough	- 371	(- 18)	- 32,811	(- 20)	- 11,580	(- 14)	+ 174.1	(+ 597)
638 Prescott	- 659	(- 38)	- 17,803	(- 17)	- 14,967	(- 18)	+ 62.0	(+ 322)
639 Prince Edward	- 430	(- 32)	- 9,532	(- 11)	- 5,823	(- 10)	+ 90.6	(+ 475)
640 Rainy River	- 287	(- 37)	- 11,395	(- 13)	- 3,642	(+ 12)	+ 18.9	(+ 378)
641 Renfrew	- 897	(- 33)	- 80,728	(- 29)	- 19,844	(- 17)	+ 93.6	(+ 337)
642 Russell	- 356	(- 34)	- 10,111	(- 18)	- 7,607	(- 17)	+ 52.7	(+ 469)
643 Simcoe	- 1,532	(- 30)	- 67,672	(- 21)	- 25,248	(- 12)	+ 544.0	(+ 540)
644 Stormont	- 448	(- 34)	- 12,025	(- 15)	- 5,314	(- 10)	+ 48.6	(+ 339)
645 Sudbury	- 292	(- 35)	- 26,097	(- 35)	- 9,005	(- 30)	+ 27.7	(+ 297)
646 Thunder Bay	- 403	(- 47)	- 22,970	(- 35)	- 4,750	(- 20)	+ 38.1	(+ 329)
647 Timiskaming	- 366	(- 34)	- 7,427	(- 8)	- 5,321	(+ 11)	+ 41.3	(+ 425)
648 Toronto Metropolitan	- 193	(- 75)	- 4,890	(- 74)	+ 4,044	(- 72)	+ 11.4	(+ 74)
649 Victoria	- 411	(- 17)	- 38,773	(- 19)	+ 13,849	(- 13)	+ 190.7	(+ 539)
650 Waterloo	- 573	(- 24)	- 11,974	(- 11)	- 6,292	(- 7)	+ 291.4	(+ 457)
651 Wellington	- 734	(- 18)	- 28,286	(- 12)	- 16,415	(- 9)	+ 460.2	(+ 574)
652 York	- 699	(- 27)	- 21,597	(- 18)	- 13,505	(- 14)	+ 584.1	(+ 532)
Manitoba								
701 Whitemouth	- 596	(- 36)	- 4,327	(- 2)	+ 5,375	(+ 6)	+ 42.7	(+ 327)
702 Steinbach	- 796	(- 26)	- 33,841	(- 9)	- 599	(0)	+ 196.6	(+ 420)

Census Division	Change in Number of Farms Absolute (ha)	(Percentage)	Change in Farmland Absolute (ha)	(Percentage)	Change in Improved Land Absolute (ha)	(Percentage)	Change in Value of Land and Buildings Absolute (in millions $)	(Percentage)
703 Red River Valley	- 1,124	(- 28)	+ 2,452	(0)	+ 10,420	(+ 2)	+ 298.1	(+ 300)
704 Pembina	- 551	(- 25)	- 9,162	(- 2)	+ 5,501	(+ 2)	+ 138.0	(+ 266)
705 Turtle Mountain	- 600	(- 20)	- 96	(0)	+ 12,226	(+ 2)	+ 267.1	(+ 456)
706 Virden	- 262	(- 18)	+ 7,943	(+ 2)	+ 14,858	(+ 7)	+ 96.1	(+ 422)
707 Brandon	- 384	(- 19)	+ 16,493	(+ 3)	+ 20,548	(+ 6)	+ 186.4	(+ 427)
708 Norfolk	- 540	(- 23)	+ 3,934	(+ 1)	+ 22,534	(+ 7)	+ 146.7	(+ 408)
709 Portage Laprairie	- 370	(- 25)	+ 290	(0)	+ 14,733	(+ 7)	+ 123.7	(+ 355)
710 St. Francis Xavier	- 216	(- 25)	- 6,162	(- 4)	- 3,043	(- 2)	+ 109.8	(+ 356)
711 Winnipeg	- 513	(- 75)	- 17,138	(- 44)	- 16,092	(- 44)	+ 13.6	(+ 65)
712 Bird's Hill	- 481	(- 30)	- 12,739	(- 9)	- 4,995	(- 4)	+ 67.3	(+ 294)
713 Selkirk	- 372	(- 25)	- 3,885	(- 3)	+ 4,801	(+ 5)	+ 76.3	(+ 342)
714 Rossen	- 224	(- 16)	+ 15,388	(+ 7)	+ 11,986	(+ 8)	+ 106.1	(+ 387)
715 Minnedosa	- 1,127	(- 27)	- 8,503	(- 1)	+ 36,298	(+ 7)	+ 210.6	(+ 312)
716 Snellmouth	- 590	(- 28)	+ 14,270	(+ 4)	+ 33,369	(+ 15)	+ 83.4	(+ 331)
717 Dauphin	- 1,125	(- 27)	+141,333	(+ 20)	+ 63,507	(+ 17)	+ 128.4	(+ 306)
718 Interlake	- 942	(- 29)	+110,281	(+ 20)	+ 74,884	(+ 41)	+ 105.8	(+ 388)
719 Northern Manitoba	+ 127	(+ 72)	+ 87,176	(+ 191)	+ 26,795	(+ 291)	+ 17.3	(+ 1,112)
720 Porcupine Hills	- 516	(- 26)	+ 42,729	(+ 15)	+ 41,857	(+ 21)	+ 74.4	(+ 299)
Saskatchewan								
801 Moose Mountain	- 970	(- 21)	- 4,722	(0)	+ 65,656	(+ 7)	+ 464.5	(+ 621)
802 Weyburn	- 904	(- 19)	+ 29,506	(+ 2)	+ 66,022	(+ 6)	+ 466.9	(+ 481)
803 Assiniboia	- 1,424	(- 28)	- 7,575	(0)	+ 29,785	(+ 2)	+ 436.3	(+ 413)
804 Cyprus Hills	- 751	(- 25)	+ 91,272	(+ 5)	+ 75,538	(+ 9)	+ 303.6	(+ 388)
805 Lower Qu'Appelle	- 1,457	(- 23)	+ 24,864	(+ 2)	+191,877	(+ 23)	+ 388.4	(+ 425)
806 Regina	- 1,270	(- 19)	+ 16,008	(+ 1)	+ 86,835	(+ 6)	+ 592.7	(+ 361)

APPENDIX C (CONTINUED)

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
807 Moose Jaw	- 1,120 (- 23)	- 40,243 (- 2)	+ 76,359 (+ 6)	+ 448.4 (+ 375)
808 Swift Current	- 1,143 (- 22)	+ 20,929 (+ 1)	+ 28,728 (+ 2)	+ 685.6 (+ 408)
809 Canora	- 2,049 (- 28)	+ 55,880 (+ 5)	+124,147 (+ 16)	+ 289.3 (+ 320)
810 Quill Lakes	- 1,403 (- 26)	+ 20,592 (+ 2)	+134,321 (+ 17)	+ 322.1 (+ 358)
811 Saskatoon	- 1,252 (- 21)	- 10,844 (- 1)	+ 45,724 (+ 4)	+ 529.9 (+ 405)
812 Biggar	- 1,033 (- 25)	- 3,023 (0)	+ 24,253 (+ 2)	+ 451.7 (+ 464)
813 Tramping Lake	- 1,104 (- 24)	+ 12,997 (+ 1)	+ 53,607 (+ 4)	+ 550.8 (+ 491)
814 Pasquia Hills	- 2,078 (- 28)	+ 69,129 (+ 5)	+160,008 (+ 16)	+ 401.0 (+ 325)
815 Prince Albert	- 2,342 (- 27)	+ 13,854 (+ 1)	+ 98,737 (+ 8)	+ 550.8 (+ 329)
816 North Battleford	- 1,661 (- 30)	+ 73,434 (+ 6)	+ 88,364 (+ 12)	+ 293.0 (+ 365)
817 Meadow Lake	- 1,005 (- 25)	+ 72,186 (+ 6)	+123,678 (+ 22)	+ 263.9 (+ 402)
818 Northern Saskatchewan	0 (0)	+ 9,126 (+ 3,639)	+ 5,743 (+8,302)	+ 2.1 (+17,452)
Alberta				
901 Medicine Hat	- 371 (- 17)	+ 30,080 (+ 2)	+ 37,281 (+ 7)	+ 330.0 (+ 353)
902 Taber Lethbridge	- 806 (- 17)	+120,198 (+ 7)	+ 78,204 (+ 9)	+ 812.6 (+ 388)
903 Fort McLeod	- 599 (- 23)	-114,224 (- 10)	+ 39,172 (+ 8)	+ 531.4 (+ 445)
904 Red Deer Valley	- 549 (- 26)	- 54,003 (- 3)	+ 94,194 (+ 16)	+ 275.5 (+ 546)
905 Drumheller	- 1,011 (- 23)	- 18,535 (- 1)	+ 39,401 (+ 3)	+ 894.9 (+ 494)
906 Calgary	- 227 (- 5)	- 84,567 (- 7)	+ 11,938 (+ 2)	+1,232.5 (+ 643)
907 Wainwright	- 1,192 (- 23)	+ 24,925 (+ 1)	+132,679 (+ 13)	+ 645.2 (+ 595)
908 Davey Thompson	- 678 (- 10)	+ 88,373 (+ 8)	+140,890 (+ 21)	+ 776.8 (+ 608)
909 Rockies	- 107 (- 61)	- 38,191 (- 32)	- 1,820 (- 16)	+ 22.9 (+ 415)
910 Vermilion	- 2,532 (- 25)	- 24,196 (- 1)	+118,787 (+ 9)	+ 838.3 (+ 483)
911 Edmonton	- 897 (- 11)	+ 53,604 (+ 5)	+108,172 (+ 15)	+1,079.8 (+ 568)
912 Athabaska	- 1,111 (- 25)	+209,301 (+ 28)	+ 76,038 (+ 20)	+ 229.5 (+ 519)

APPENDIX C (CONTINUED)

Census Division	Change in Number of Farms Absolute (Percentage) (ha)	Change in Farmland Absolute (Percentage) (ha)	Change in Improved Land Absolute (Percentage) (ha)	Change in Value of Land and Buildings Absolute (Percentage) (in millions $)
913 Barrhead	- 1,277 (- 18)	+134,656 (+ 13)	+159,948 (+ 25)	+ 488.0 (+ 523)
914 Edson	- 170 (- 17)	+ 19,707 (+ 14)	+ 28,868 (+ 54)	+ 60.1 (+ 641)
915 Peace	- 555 (- 6)	+745,257 (+ 42)	+560,050 (+ 54)	+ 694.6 (+ 593)
British Columbia				
1 East Kootenay	+ 28 (+ 7)	+ 17,915 (+ 28)	+ 1,661 (+ 10)	+ 46.8 (+ 680)
2 Central Kootenay	- 302 (- 30)	- 14,269 (- 30)	- 1,275 (- 7)	+ 69.0 (+ 386)
3 Okanagan	+ 18 (0)	- 22,433 (- 9)	- 2,639 (- 4)	+ 546.8 (+ 503)
4 Vancouver - Fraser Valley	- 1,311 (- 18)	- 15,647 (- 14)	- 2,600 (- 3)	+ 974.0 (+ 470)
5 Vancouver Island	- 165 (- 8)	- 15,336 (- 26)	- 741 (- 3)	+ 243.2 (+ 472)
6 Cariboo - Thompson	+ 210 (+ 10)	+135,465 (+ 17)	+ 27,236 (+ 23)	+ 350.2 (+ 583)
7 Coast	- 64 (- 67)	- 7,176 (- 84)	- 711 (- 52)	+ 1.5 (+ 90)
8 Peace River - Laird	+ 418 (+ 30)	+399,996 (+ 114)	+171,673 (+ 115)	+ 167.2 (+ 693)
9 Fraser - Fort George	+ 323 (+ 97)	+ 40,632 (+ 93)	+ 18,826 (+ 148)	+ 61.8 (+ 1,179)
10 Skeena - Queen Charlotte	+ 128 (+ 320)	+ 14,831 (+ 1,057)	+ 4,132 (+1,285)	+ 14.0 (+ 1,623)
11 Bulkley Necbako Stikine	+ 215 (+ 35)	+ 91,633 (+ 88)	+ 30,405 (+ 96)	+ 83.9 (+ 974)

APPENDIX D

SELECTED STATISTICS FROM THE NATIONAL DATA BASE IMPROVED LAND TRENDS 1961-1976 (IN HECTARES)

APPENDIX D

Selected Statistics from the National Data Base
Improved Land Trends 1961-1976
(in hectares)

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
Newfoundland				
101 Avalon	4,200	4,127	3,596	5,790
102 Southern Newfoundland	190	345	220	284
104 Corner-Brook/Stephenville	2,268	2,067	1,454	1,940
105 Northern Newfoundland	997	1,108	1,488	1,957
106 Grand Falls/Gander	620	674	988	1,164
Prince Edward Island				
201 Kings	43,495	42,122	34,345	37,085
202 Prince	88,950	90,163	78,390	76,980
203 Queens	102,028	98,238	87,176	89,660
Nova Scotia				
301 Annapolis	15,058	15,880	12,777	14,801
302 Antigonish	10,218	9,906	7,462	9,206
303 Cape Breton	4,237	4,219	3,123	2,679
304 Colchester	25,449	24,641	21,461	21,732
305 Cumberland	30,596	26,908	20,854	24,746
306 Digby	4,328	2,689	2,235	2,267
307 Guysborough	3,355	2,688	1,528	1,557
308 Halifax	6,984	7,290	6,176	6,690
309 Hants	19,837	19,777	16,697	18,824
310 Inverness	10,608	10,554	5,857	6,028
311 Kings	31,461	34,170	31,508	32,588
312 Lunenburg	8,875	8,516	6,088	5,795

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
313 Pictou	21,315	21,195	14,388	16,123
314 Queens	921	767	596	889
315 Richmond	1,256	948	500	724
316 Shelburne	358	241	404	140
317 Victoria	2,821	2,548	1,647	1,168
318 Yarmouth	3,695	3,627	2,873	2,671
New Brunswick				
401 Albert	8,077	6,491	5,086	5,194
402 Carleton	54,780	53,988	44,090	44,580
403 Charlotte	3,976	2,862	2,426	2,643
404 Gloucester	16,044	12,521	7,734	7,406
405 Kent	25,532	20,499	13,179	9,888
406 Kings	34,407	30,977	25,908	24,238
407 Madawaska	28,194	24,173	18,113	15,491
408 Northumberland	9,384	7,007	4,084	3,774
409 Queens	9,336	7,719	5,739	6,514
410 Restigouche	13,752	11,537	8,383	6,315
411 Saint John	1,371	1,235	713	438
412 Sunbury	5,744	4,567	3,451	3,566
413 Victoria	21,712	20,299	17,581	18,403
414 Westmorland	39,366	33,484	25,969	24,862
415 York	25,332	21,020	14,723	15,355
Quebec				
501 Abitibi	108,917	112,481	74,743	79,274
502 Argenteuil	26,860	25,905	19,403	17,116

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
503 Arthabaska	90,609	92,763	81,580	72,566
504 Bagot	68,464	67,825	62,864	58,581
505 Beauce	112,028	112,543	90,438	77,041
506 Beauharnois	22,480	21,990	20,871	20,768
507 Bellechasse	52,738	48,892	43,686	38,839
508 Berthier	40,297	37,926	36,220	33,911
509 Bonaventure	39,611	32,553	24,216	20,784
510 Brome/Shefford	98,891	87,649	70,079	61,631
511 Chambly	16,082	12,017	9,257	7,325
512 Champlain	63,057	60,166	55,235	48,849
513 Charlevoix-Est	12,889	13,255	8,829	8,205
514 Charlevoix-Ouest	17,710	16,564	11,868	10,610
515 Châteauguay	40,027	38,302	34,651	35,543
516 Chicoutimi	56,039	55,055	42,747	36,389
517 Compton	49,406	50,672	42,384	38,532
518 Deux-Montagnes	41,112	40,405	35,344	31,744
519 Dorchester	78,370	68,914	58,770	51,735
520 Drummond	72,140	71,229	62,719	54,716
521 Frontenac	55,658	53,500	41,796	37,076
522 Gaspé-Est	6,663	5,602	3,479	2,232
523 Gaspé-Ouest	8,835	6,662	4,727	3,175
524 Gatineau	43,332	43,404	34,161	27,057
525 Hull	8,971	5,801	4,011	3,801
526 Huntingdon	45,127	46,862	39,036	40,227
527 Iberville	36,850	36,266	33,146	31,663

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
528 Ile-de-Montréal/Ile-Jésus	13,743	10,555	8,438	7,620
529 Iles-de-la-Madeleine	1,555	1,748	630	778
530 Joliette	48,169	43,098	39,527	35,660
531 Kamouraska	47,698	47,908	42,352	37,991
532 Labelle	38,546	36,063	26,504	23,442
533 Lac St-Jean-Est	41,761	43,486	41,125	36,692
534 Lac St-Jean-Ouest	78,205	81,602	71,013	66,329
535 Laprairie	27,330	26,164	22,278	21,029
536 L'Assomption	37,547	37,046	32,421	28,772
537 Lévis	26,948	24,058	20,622	20,426
538 L'Islet	35,961	33,928	26,788	24,392
539 Lotbinière	70,174	69,108	67,043	64,158
540 Maskinongé	34,049	32,926	29,406	27,138
541 Matane/Matapédia	90,534	89,056	74,039	67,782
543 Mégantic	67,373	70,002	58,502	52,944
544 Missisquoi	49,002	47,366	43,215	41,471
545 Montcalm	24,464	23,241	21,298	20,546
546 Montmagny	30,569	27,537	21,818	19,039
547 Montmorency No. 1	11,525	9,215	6,597	5,939
548 Montmorency No. 2	11,813	10,544	8,732	8,786
549 Napierville	30,414	30,020	27,688	29,273
550 Nicolet	99,011	92,946	83,176	74,930
551 Papineau	56,774	53,078	41,870	39,922
552 Pontiac	60,486	54,280	45,788	47,819
553 Portneuf	61,542	59,294	49,628	45,010
554 Québec	9,770	8,754	5,156	5,281

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
555 Richelieu	30,020	29,515	26,244	22,553
556 Richmond	44,278	44,910	37,630	32,437
557 Rimouski	72,267	73,171	62,749	59,038
558 Rivière-du-Loup	71,574	70,700	63,021	57,358
559 Rouville	43,692	42,778	39,647	38,897
560 Saguenay	6,504	7,952	6,186	5,925
561 St-Hyacinthe	50,265	47,948	47,463	48,533
562 St-Jean	31,516	30,377	28,555	24,616
563 St-Maurice	35,036	30,769	23,107	19,516
565 Sherbrooke	16,345	15,488	10,671	9,080
566 Soulanges	26,335	25,772	22,129	21,204
567 Stanstead	38,022	41,941	31,851	30,880
568 Témiscamingue	62,743	68,373	61,087	55,024
569 Témiscouata	37,549	35,531	26,987	22,549
570 Terrebonne	24,422	20,429	12,375	11,319
571 Vaudreuil	26,535	24,558	21,096	21,710
572 Verchères	37,947	36,620	32,627	27,078
573 Wolfe	46,546	49,437	38,060	30,585
574 Yamaska	61,887	62,107	56,074	55,251
Ontario				
601 Algoma	26,771	27,979	21,438	22,549
602 Brant	67,165	70,046	66,517	65,895
603 Bruce	214,445	215,944	203,129	208,575
604 Cochrane	32,961	30,441	18,396	23,062
605 Dufferin	94,339	88,726	78,845	76,467

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
606 Dundas	66,845	67,638	62,009	62,135
607 Durham	132,130	128,960	112,988	116,828
608 Elgin	127,359	131,961	128,024	131,603
609 Essex	141,812	139,654	135,804	138,779
610 Frontenac	62,730	61,924	50,960	51,694
611 Glengarry	68,376	66,895	57,366	57,626
612 Grenville	40,807	45,177	36,084	35,589
613 Grey	226,653	224,074	198,896	198,671
614 Haldimand/Norfolk	195,445	195,256	185,991	183,112
615 Haliburton	5,708	4,176	1,887	2,220
616 Halton	50,611	49,050	39,461	41,078
617 Hamilton/Wentworth	63,269	59,638	56,450	55,582
618 Hastings	91,633	88,941	78,055	76,206
619 Huron	252,357	251,024	247,317	253,158
620 Kenora	9,617	9,806	8,121	9,100
621 Kent	201,404	208,381	209,815	210,987
622 Lambton	193,008	200,828	189,326	198,684
623 Lanark	66,657	68,179	60,113	60,531
624 Leeds	68,168	70,706	60,476	63,001
625 Lennox and Addington	62,305	60,276	50,652	53,915
626 Manitoulin	26,312	23,996	23,968	25,109
627 Middlesex	217,000	224,923	217,664	224,911
628 Muskoka	10,643	9,397	5,450	5,690
629 Niagara	97,053	96,971	85,161	85,448
630 Nipissing	31,829	30,123	23,441	26,258

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
631 Northumberland	98,652	99,356	84,305	88,015
632 Ottawa/Carleton	127,969	123,943	106,000	102,196
633 Oxford	152,215	149,718	149,351	153,857
634 Parry Sound	24,755	26,695	18,101	19,576
635 Peel	70,103	66,159	53,211	52,869
636 Perth	184,288	184,845	179,556	181,872
637 Peterborough	85,589	81,607	67,989	74,008
638 Prescott	84,914	86,389	77,366	69,946
639 Prince Edward	57,003	57,719	50,585	51,179
640 Rainy River	31,236	33,723	28,243	34,879
641 Renfrew	114,521	109,350	94,297	94,676
642 Russell	45,295	47,401	42,339	37,688
643 Simcoe	208,846	208,795	182,002	183,598
644 Stormont	51,464	51,602	44,220	46,150
645 Sudbury	29,761	26,224	18,475	20,755
646 Thunder Bay	24,246	25,066	19,667	19,496
647 Timiskaming	49,399	53,797	49,060	54,721
648 Toronto Metropolitan	5,600	4,918	2,157	1,556
649 Victoria	104,509	101,626	83,670	90,660
650 Waterloo	92,692	91,245	85,022	86,399
651 Wellington	185,371	184,727	166,466	168,955
652 York	94,319	90,588	79,605	80,813
Manitoba				
701 Whitemouth	83,606	85,591	84,660	88,982
702 Steinbach	254,647	257,434	254,656	254,048

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
703 Red River Valley	457,705	462,679	461,241	468,126
704 Pembina	318,650	323,297	324,758	324,151
705 Turtle Mountain	553,394	561,448	573,472	565,620
706 Virden	222,534	237,003	236,379	237,393
707 Brandon	332,356	349,983	351,272	352,904
708 Norfolk	332,746	344,253	352,371	355,280
709 Portage-la-Prairie	212,584	215,917	217,816	227,317
710 St. Francis Xavier	168,419	171,731	168,143	165,376
711 Winnipeg	36,182	31,980	31,062	20,089
712 Bird's Hill	117,611	115,030	114,882	112,615
713 Selkirk	93,434	96,215	94,482	98,235
714 Rosser	144,593	149,506	153,363	156,580
715 Minnedosa	525,013	549,024	571,607	561,312
716 Shellmouth	220,226	234,346	251,938	253,595
717 Dauphin	374,237	396,509	430,938	437,745
718 Interlake	183,763	207,900	246,262	258,648
719 Northern Manitoba	9,210	23,527	28,945	36,006
720 Porcupine Hills	199,361	221,932	231,866	241,218
Saskatchewan				
801 Moose Mountain	927,856	991,943	1,021,449	993,513
802 Weyburn	1,117,294	1,186,028	1,180,273	1,183,317
803 Assiniboia	1,232,013	1,283,057	1,262,684	1,261,798
804 Cyprus Hills	801,707	852,147	839,121	877,245
805 Lower Qu'Appelle	832,029	925,367	1,012,023	1,023,907
806 Regina	1,343,345	1,406,225	1,418,873	1,430,180

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
807 Moose Jaw	1,224,561	1,276,603	1,281,670	1,300,921
808 Swift Current	1,483,813	1,510,746	1,511,397	1,512,542
809 Canora	757,925	814,022	883,153	882,072
810 Quill Lakes	775,072	854,131	913,189	909,394
811 Saskatoon	1,300,143	1,341,705	1,310,038	1,345,867
812 Biggar	977,658	993,923	1,003,053	1,001,912
813 Tramping Lake	1,198,253	1,244,302	1,233,996	1,251,860
814 Pasquia Hills	974,248	1,063,988	1,117,463	1,134,256
815 Prince Albert	1,171,486	1,232,206	1,276,923	1,270,224
816 North Battleford	756,753	794,059	846,995	845,118
817 Meadow Lake	569,948	624,601	668,278	693,626
818 Northern Saskatchewan	69	248	2,184	5,813
Alberta				
901 Medicine Hat	557,914	577,759	580,288	595,195
902 Taber/Lethbridge	914,498	945,408	955,315	992,703
903 Fort McLeod	509,294	513,083	506,325	548,466
904 Red Deer Valley	592,546	632,348	641,109	686,741
905 Drumheller	1,175,877	1,198,098	1,196,806	1,215,278
906 Calgary	725,273	762,325	741,495	737,211
907 Wainwright	987,673	1,060,840	1,106,529	1,120,353
908 Davey Thompson	674,593	746,278	785,535	815,484
909 Rockies	11,048	19,970	20,640	9,228
910 Vermillion	1,265,276	1,354,247	1,391,823	1,384,063
911 Edmonton	709,570	781,922	810,915	817,742
912 Athabaska	382,664	418,823	451,049	458,703

Standardized Census Division	Total Improved Area 1961	1966	1971	1976
913 Barrhead	633,892	705,181	764,719	793,841
914 Edson	53,774	73,491	86,631	82,643
915 Peace	1,037,088	1,245,381	1,475,016	1,597,139
British Columbia				
1 East Kootenay	16,395	18,990	15,037	18,056
2 Central Kootenay	19,103	19,541	17,145	17,827
3 Okanagan	72,312	79,540	78,851	69,673
4 Vancouver/Fraser Valley	80,290	81,762	78,582	77,689
5 Vancouver Island	23,413	22,343	21,727	22,672
6 Cariboo/Thompson	120,571	144,666	122,586	147,808
7 Coast	1,380	1,677	581	669
8 Peace River/Laird	149,203	229,173	307,921	320,877
9 Fraser/Fort George	12,695	15,160	19,148	31,521
10 Skeena/Queen Charlotte	322	150	2,145	4,454
11 Bulkley/Nechako/Stikine	31,577	40,033	46,399	61,983

NOTE: Totals do not add due to rounding during the metrification process.

APPENDIX E

PROCEDURES IN THE SAUGEEN VALLEY QUESTIONNAIRE

Once it was determined that the individual landowner was the only source of reliable information on the causes and processes of land-use change, a means of obtaining this information in a case study area (the Saugeen Valley) still had to be found. After considering the various questionnaire procedures, it was decided that direct interviews would best provide the necessary volume of detailed information.

A random sample of landowners was selected. Each township, concession, and lot was numbered independently, and a random number generator was used to select lots and quarter-lots in cases of subdivision. Duplicates were rejected. The owner of a chosen property was identified through the township assessment rolls and became an interim subject.

Local interviewers were hired because of their knowledge of the local situation. Interviews were conducted from November through March (the winter of 1977-78), when farmers were most likely to have spare time. The Statistics Canada rule of 10 personnel was used, and the interviewers had a preparatory one-day course in procedure. There were 480 serviceable interviews (only three refusals) and two corporate interviews (Krug Furniture, with large forest holdings, and the Saugeen Valley Conservation Authority). The data matrix of 480 cases with 254 variables was analysed through the SPSS system.

No. _____

SAUGEEN LAND USE QUESTIONNAIRE

PART ONE: Questionnaire Identification (TO BE COMPLETED AFTER INTERVIEW)

1. Type of respondent
   - ☐ 1. Single owner
   - ☐ 2. Joint family owners
   - ☐ 3. Partnership
   - ☐ 4. Lessee
   - ☐ 5. Other (specify) _____

2. Person(s) interviewed.
   - ☐ 1. Male
   - ☐ 2. Female
   - ☐ 3. Husband and wife
   - ☐ 4. Group, partners, etc
   - ☐ 5. Other (specify) _____

3. Date of interview _____

4. Location of property sampled:
   - Township _____
   - Concession _____
   - Lot _____
   - Quarter _____

5. Management unit size: _____ acres. (Ref. Q.7,11,12)

6. Number of commercial activities: _____ (Ref. Q. 17)

THUMBNAIL SKETCH

(Special remarks to be taken into consideration when coding or interpreting this interview.)

i.e. Commercial holdings, mechanization, unique situation etc.

PART TWO: PROPERTY
USE CLI MAP TO IDENTIFY LAND, SAUGEEN BASIN, ETC.

(The first of these questions concern your land in the Saugeen River basin (Bruce, Grey or Wellington Counties). We would like to learn about the characteristics of your land and your land ownership history.)

7. Do you own any land in the Saugeen Basin? (Bruce, Grey or Wellington Counties)

   ☐ Yes ☐ No → JUMP TO Q. 12

   If yes →
   - What is the total area owned? _____ acres
   - How much is open or cleared? _____ acres
   - How much cannot physically be used for crops or pasture? (too wet, steep, rocky, etc.) _____ acres
     - IF ANY, why can it not be used?

     _____

8. How many separate blocks is this land in? (not adjacent)

   Number _____

   IF ONE BLOCK ONLY, PROCEED TO NEXT Q.

   How large is each block?

   1. _____ acres
   2. _____ acres
   3. _____ acres
   4. _____ acres

9. In which year did you first acquire any land in the Saugeen Basin? (Bruce, Grey or Wellington Counties)

   _____ (year)

   In which year did you first acquire any of the land you now own in the Saugeen Basin?

   _____ (year)

10. How did you acquire your land? (purchase, inherit, gift, etc.)
    - ☐ 1. All purchased
    - ☐ 2. All inherited
    - ☐ 3. Some inherited some purchased
    - ☐ 4. Gift (not inheritance)
    - ☐ 5. Other (sundry combinations) please specify:

      _____

11. Do you lease any property to other users?

    ☐ Yes ☐ No → PROCEED TO NEXT Q.

    If yes →
    - How many acres are leased? _____ acres
    - How long is the term of the lease ? _____ years
    - What is the land used for by the lessee?

      _____

12. Do you lease any land from someone else in the Saugeen Basin? (Bruce, Grey or Wellington Counties)

☐ Yes ☐ No → JUMP TO Q. 14

If yes →
- How many acres do you lease? _____ acres
- How long is the term of the lease? _____ years
- How much of the leased land is open or cleared _____ acres
- How much cannot physically be used for crops or pasture? (too rocky, wet, steep, etc) _____ acres
  - → IF ANY, Why can it not be used?

_____

13. In what year did you first lease land in the Saugeen Basin? (Bruce, Grey or Wellington Counties)

_____ (year)

14. Do you presently own any land outside the Saugeen Basin?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes →
- How much land? _____ acres
- Where is this land?

CHECK AS MANY AS APPLY

☐ 1. Southern Ontario
☐ 2. Other Ontario
☐ 3. Canada outside Ontario
☐ 4. United States
☐ 5. Elsewhere - please specify -

_____

✱ Which of these uses best describes the primary use of this other land outside the Saugeen Basin?

CHECK ONLY ONE

☐ 1. Farm
☐ 2. Primary residence
☐ 3. Secondary residence (cottage)
☐ 4. Recreation (no residence)
☐ 5. Commercial
☐ 6. Investment
☐ 7. Other - please specify -

_____

15. Were you a land owner elsewhere, before owning or leasing land in the Saugeen Basin?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes →
- Where was this land?

CHECK AS MANY AS APPLY

☐ 1. Southern Ontario
☐ 2. Other Ontario
☐ 3. Canada outside Ontario
☐ 4. United States
☐ 5. Elsewhere - please specify -

_____

✱ Which of these uses best describes the primary use of this land?

CHECK ONE ONLY

☐ 1. Farm
☐ 2. Primary residence (only)
☐ 3. Secondary residence (cottage)
☐ 4. Recreation (no residence)
☐ 5. Commercial
☐ 6. Investment
☐ 7. Other - please specify -

_____

PART THREE: LAND USE

(The next set of questions are about how you use your land and what activities take place on your land.)

16. ✱ Which of these uses occur on your land in the Saugeen Basin? (management unit only) CHECK AS MANY AS APPLY

☐ 1. Commercial farming
☐ 2. Hobby or recreational farming → JUMP TO Q. 18
☐ 3. Residential
☐ 4. Commercial non-farm activities → PROCEED TO NEXT Q.
☐ 5. Vacant land → JUMP TO Q. 23
☐ 6. Forestry → JUMP TO Q. 18
☐ 7. Other - please specify -

_____

17. What commercial non-farm activities occur on your land? How many acres are occupied by each?

Commercial Activity	Acres

18. Is your principal residence on this land?

☐ Yes → PROCEED TO NEXT Q.

☐ No

If no → Where is your principal residence?

_____

→ Are there any residences at all on the land?

☐ Yes → If yes, Whose?

_____

_____

☐ No → If no, do you intend to build one?

☐ Yes ☐ No

19. Do you have any crops, pasture, livestock or poultry?

☐ Yes

If yes → What is the main farming enterprise?

_____

☐ No → JUMP TO Q. 22

(We would like to get a few specific details on your use of agricultural land.)

20. What crops or type of pasture did you have in 1977, and how many acres were used for each? (differentiate improved and unimproved pasture)

Crop or Pasture Type	Acres

21. What livestock or poultry do you have, and what are the numbers of each?

Livestock or Poultry Type	Numbers

22. Do you have a woodlot on your land? (owned or leased)

☐ Yes

If yes → How many acres of woodlot? _____ acres

→ Why do you have a woodlot?

_____

_____

→ What are your plans for the woodlot?

_____

_____

→ Is the woodlot native or plantation?

☐ 1. Native
☐ 2. Plantation
☐ 3. Mixture
☐ 4. Don't know

→ What are the main tree species?

_____

_____

☐ Don't know

→ Did you derive any income from this woodlot in 1977?

☐ Yes

If yes → What percentage of your family income derived from the woodlot?

_____ %PROCEED TO NEXT Q.

☐ No

If no → To your knowledge has income ever been derived from this woodlot?

☐ Yes ☐ No

→ If yes, would you give me some details?

_____

_____

23. ✱ Do you have any of these activities on your land? If so, can you please give some details including the area covered and any resulting problems.

CHECK AS MANY AS APPLY

		Acres
☐	1. Sand, gravel topsoil removal.....	
☐	2. Commercial Recreation.....	
☐	3. Lodging (motel).....	
☐	4. Trailer Park or Campground.....	
☐	5. Light industry.....	
☐	6. Commercial services.....	
☐	7. Major easements (power lines).....	
☐	8. Institutional uses.....	
☐	9. Other.....	
☐	10. None.....	

Detail: _____

_____

_____

24. ✱ Which of these recreational activities took place on your land in the past year?

CHECK AS MANY AS APPLY

- ☐ 1. Hiking and walking
- ☐ 2. Picnicking
- ☐ 3. Camping
- ☐ 4. Nature study
- ☐ 5. Berry picking
- ☐ 6. Hunting
- ☐ 7. Target shooting and archery
- ☐ 8. Wheeled recreational vehicles
- ☐ 9. Horseback riding
- ☐ 10. Fishing
- ☐ 11. Swimming
- ☐ 12. Boating
- ☐ 13. Skating
- ☐ 14. Sleighing or tobogganing
- ☐ 15. Skiing
- ☐ 16. Snowmobiling
- ☐ 17. Other - please specify _____

25. ✱ Who has used your land for outdoor recreational activities in the past year? Please select from these categories.

CHECK AS MANY AS APPLY

- ☐ 1. Family members
- ☐ 2. Friends
- ☐ 3. General public with your permission
- ☐ 4. General public without your permission
- ☐ 5. Organized groups or clubs
- ☐ 6. Others - please specify

☐ 7. Nobody

Do you post your land? ☐ Yes ☐ No

26. Does recreational activity either on your land or nearby affect you or your use of the land?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → How are you affected?

_____

_____

_____

27. Do you have any unused land? (Vacant land not yet dealt with in this questionnaire)

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes →
- How much land? _____ acres
- How long has it been unused? _____ years
- Why is it unused? _____

_____

_____
- To your knowledge, was this land ever used? _____

_____

_____

28. a. Do you consider your land to be good, fair, or poor for agriculture, or to have no agricultural capability?

- ☐ 1. Good for agriculture
- ☐ 2. Fair for agriculture
- ☐ 3. Poor for agriculture
- ☐ 4. With no agricultural capability

b. Are you aware of the existance of agricultural land capability maps or the Canada Land Inventory?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → Do you know what class your land is?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What class or classes is your land?

_____

29. If you were to sell all of your property today, what value would you put on it? (in $ per acre, including all structures and improvements but not livestock)

$_____/acre

30. a. ✱ Please indicate which of these reasons for owning or leasing land were important to you when you first acquired this land?

b. What reasons are important now?

c. What reason is most important now?

	CHECK AS MANY AS APPLY		CHECK ONE ONLY
	At first	Now	Most important now
1. Livelihood	☐	☐	☐
2. Recreation	☐	☐	☐
3. Investment	☐	☐	☐
4. Residence/Shelter	☐	☐	☐
5. Lifestyle	☐	☐	☐
6. Retirement	☐	☐	☐
7. Desire to own land	☐	☐	☐
8. Other - please specify-	☐	☐	☐

_____

PART FOUR: LAND USE CHANGE

(We would now like to look at any changes that may have been made to your land and land use, and the reasons for any changes.)

31. Can you tell me the use of this property in 1971? 1961? 1951?

1971 → Use: _____

☐ Don't know

1961 → Use: _____

☐ Don't know

1951 → Use: _____

☐ Don't know

32. a. Please indicate if any of these changes have been made on your land?

* b. When did they occur?

c. Do you anticipate any of these changes in the next five years?

		1951-1970	1971-1977	1978-1982
1.	Splitting of land	☐	☐	☐
2.	Severance of house site	☐	☐	☐
3.	New residence	☐	☐	☐
4.	New farm buildings	☐	☐	☐
5.	Fencing of unfenced areas	☐	☐	☐
6.	Fence removal	☐	☐	☐
7.	Woodlot clearance	☐	☐	☐
8.	Woodlot planting	☐	☐	☐
9.	Drainage (field, swamp, etc)	☐	☐	☐
10.	Farm pond construction	☐	☐	☐
11.	Irrigation system	☐	☐	☐
12.	Gravel extraction	☐	☐	☐
13.	Bulk handling installation	☐	☐	☐
14.	Topsoil removal	☐	☐	☐
15.	Other - please specify - _____	☐	☐	☐

_____

33. Have you bought, sold, leased or otherwise changed the amount of your land since 1971?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What have you done?

1. Bought _____ acres
2. Sold _____ acres → for → ☐ 1. Farm ☐ 2. Recreation, cottage, etc. ☐ 3. Residence ☐ 4. Commercial ☐ 5. Industrial ☐ 6. other - please specify _____

3. Leased _____ acres ☐ from others ☐ to others

4. Other - please specify - _____

→ Why did you alter your holdings?

_____

_____

34. Has the use of this land intensified, reduced, or remained the same since 1971?

☐ Remained the same

☐ Intensified How? _____

_____

☐ Reduced How? _____

_____

35. Have there been any major changes in your land use since 1971?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What changes were made? _____

_____

→ Why were these changes made? _____

_____

36. IF RESIDENCE ONLY (SMALL ACREAGE) PROCEED TO NEXT Q.

What is the most recent activity added on your land? (new crop, commercial activity etc.)

_____

_____

Why was this added? _____

_____

What is the most recent activity dropped? _____

_____

Why was this dropped? _____

_____

37. Are you aware of any government policies or other changes which have affected you or your land use in recent years?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What policies or changes? _____

_____

→ How have you or your land use been affected? _____

_____

38. Has the Douglas Point power development affected you in any way?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → How has it affected you? _____

_____

_____

39. Has the value of this land changed greatly since 1971? IF SO, How has it changed?

- ☐ 1. up greatly
- ☐ 2. up a little
- ☐ 3. remained the same
- ☐ 4. down a little
- ☐ 5. down greatly
- ☐ 6. Don't know

PUT FURTHER VOLUNTEERED INFORMATION HERE.

40. IF NO FARM ACTIVITIES → JUMP TO Q. 47

Has there been any major change in farm costs or market prices which has caused you to alter your farm activities in the past five years?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What changes in your activities were caused? _____

→ By what changes in farm costs or prices? _____

41. Have there been any innovations or new practices which have caused you to change your use of land or your activities in the past five years?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What innovations? _____

→ What changes in your land use resulted? _____

42. Have you experienced any major problems getting adequate farm labour?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → Would you please elaborate on that? (details) _____

43. (a) Do you sell through a marketing board?

☐ Yes ☐ No → CONTINUE TO (b)

If yes → What products do you sell through a marketing board? _____

(b) Do you farm under contract?

☐ Yes ☐ No → CONTINUE TO (c)

If yes → What products are under contract? _____

→ To whom are you under contract? _____

(c) Do you sell direct at the farm gate?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What products are sold at the farm gate? _____

44. To whom do you sell the bulk of your produce? (firm name, or, if at auction, which auctions) _____

45. Has the way you market your produce changed substantially since 1971?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → How has it changed? _____

46. Do you receive any farm subsidies?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → Which subsidies? _____

PART FIVE: THE FUTURE

(I would now like to turn to your view of the future of your land and your thoughts concerning future problems that may be encountered in this area.)

47. (a) Within the next five years, do you anticipate changing the size of your land holdings?

☐ Yes ☐ No → CONTINUE TO (b)

If yes → How do you anticipate changing? (by how much)

1. Increasing by _____ acres
2. Decreasing by _____ acres

→ Why do you intend to do this? _____

(b) Within the next five years, do you anticipate severing a property? (for house etc.)

☐ Yes ☐ No → CONTINUE TO (c)

If yes → How much land? _____ acres

→ What will the severed property be used for? _____

→ Why do you wish to sever? _____

(c) Within the next five years, do you anticipate making any major changes or improvements in the use of your land?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What changes or improvements? _____

48. Do you forsee any major land problems in this area in the next five years?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What problems? _____

49. Should agricultural land be reserved or protected for future agricultural use?

☐ Yes ☐ No ☐ Qualified answer

→ Why do you feel this way? (details) _____

50. Do you think that government action is required to protect farmland?

☐ Yes

If yes → Why? _____

☐ No

If no → Why not? _____

PROCEED TO NEXT Q.

What action should be taken? _____

What level of government should act? (federal, provincial, municipal, all) _____

51. Do you expect this property to remain in your family, to be sold, or what?

☐ 1. remain in family
☐ 2. to be sold
☐ 3. other - please specify _____
☐ 4. don't know

PART SIX: Respondent Information

(To finish this questionnaire, I would like to ask you some things about yourself, your family and your occupation. This information is needed to differentiate the land use characteristics of, say, people who are young and just starting out, and those who may be approaching retirement; and to enable us to relate land use to such things as off-farm or secondary occupations or the amount of labour employed on the land.)

52. Are you married, divorced, separated, widowed or have you never been married?

- ☐ 1. Married
- ☐ 2. Divorced
- ☐ 3. Separated
- ☐ 4. Widowed → PROCEED TO NEXT Q.
- ☐ 5. Never been married → JUMP TO Q. 54

53. Do you have any children living with you?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What is their sex and age?

Sex	Age

54. In which of these age brackets do you fall?

- ☐ 1. less than 20
- ☐ 2. 20-29
- ☐ 3. 30-39
- ☐ 4. 40-49
- ☐ 5. 50-59
- ☐ 6. 60-69
- ☐ 7. 70 and over → Do you have any pension income?

☐ Yes ☐ No

55. Where were you brought up as a child?

- ☐ 1. Saugeen basin
- ☐ 2. Ontario outside Saugeen basin
- ☐ 3. Canada other than Ontario
- ☐ 4. The United States
- ☐ 5. The United Kingdom
- ☐ 6. Germany
- ☐ 7. Netherlands
- ☐ 8. Western Europe (other)
- ☐ 9. Eastern Europe
- ☐ 10. Middle East
- ☐ 11. Asia
- ☐ 12. South America
- ☐ 13. Africa
- ☐ 14. Australasia
- ☐ 15. Other (specify) _____

56. What is the highest level of education you have?

- ☐ 1. None
- ☐ 2. Primary school
- ☐ 3. High school
- ☐ 4. University
- ☐ 5. Post-graduate
- ☐ 6. Technical or Community college → What was your major subject? _____
- ☐ 7. Agricultural college
- ☐ 8. Other - please specify - _____

57. Have you, or anyone else living with you, had any special training courses?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes → What courses? _____

_____

58. What is your primary occupation? _____

_____

IF NECESSARY FOR CLARITY - (Would you please tell me some details about your work?)

_____

_____

59. How long have you been involved in this primary occupation?

_____ years

60. Do you have any other or secondary occupations?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes:
- What are your secondary occupations?
  1. _____
  2. _____
  3. _____
- What percentage of your time do you devote to secondary occupations?
  _____%
- What percentage of your total family income derives from your secondary occupations?
  _____%

61. What percentage of your total family income derives from your land in the Saugeen basin?

_____%

62. Does anyone else living with you earn an income? (wife, companion, children, etc.)

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes:
- Is any of this income derived from this land?
  ☐ Yes ☐ No
- What is his (her, their) occupation? (AGAIN CLARIFY)
  _____
  _____
- Does he (she, they) have a secondary occupation?
  ☐ Yes ☐ No → PROCEED TO NEXT Q.

  If yes:
  - What are the secondary occupations?
    1. _____
    2. _____
  - What percentage of time is devoted to these secondary occupations?
    _____%
  - What percentage of total family income is derived from these secondary occupations?
    _____%

63. IF RESIDENCE ONLY (SMALL ACREAGE) → JUMP TO Q. 66

Do any family or relations work on this land?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes:
- Who? _____
  _____
- What sort of work is done? _____
  _____
- Are they paid?
  ☐ Yes ☐ No

64. Do you employ anyone else full-time, part-time, or seasonally on this land?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes:
- How many are full-time? _____
- How many are part-time? _____
- How many are seasonal? _____
- What do you use employed labour for? _____
  _____

65. Do you have any custom work done?

☐ Yes ☐ No → PROCEED TO NEXT Q.

If yes:
- What custom work? _____
  _____

66. Generally, what do you see as the long term future of your land in this area?

_____
_____
_____
_____
_____

BIBLIOGRAPHY

Agricultural Research and Development Act. 1972. "Planning for Agriculture in Southern Ontario." Report No. 4. Ottawa, Ontario.

Agriculture Canada. 1980. *Food Market Commentary*. Vol. 2, No. 4. Ottawa, Ontario.

————. 1981a. *Challenge for Growth: An Agri-Food Strategy for Canada*. Ottawa, Ontario.

————. 1981b. *Selected Agricultural Statistics for Canada and the Provinces — 1981*. Publication No. 81/2. Regional Development and International Affairs Branch. Ottawa, Ontario.

Allee, D.J. 1966. "Changing Use of Rural Resources," *Journal of Farm Economics*, Vol. 48, 1297-1305.

Alonso, W. 1964. *Location and Land Use*. Harvard University Press. Cambridge, Mass.

Amato, J.P. 1976. *The Physical Environment Factor in the Analysis of Agricultural Land Use Patterns: A Case Study in Western New York*. Ph.D. (Geography). University of Toronto. Toronto, Ontario.

Archdekin, W.L. 1976. *Some Aspects of the Ontario Farm Enlargement and Consolidation Program*. M.A. (Geography). University of Guelph. Guelph, Ontario.

Archer, R.W. 1978. "Land Pooling for Planned Urban Development in Perth, Western Australia." *Regional Studies*, Vol. 12, No. 4, 397-408.

————. 1979. "Policy and Research Issues in Land Subdivision for Rural Residences, Hobby-Farms and Rural Retreats," *The Valuer*, Vol. 25, No. 6, 422-430.

Auerbach, L. and A. Gerber. 1976. *Implications of the Changing Age Structure of the Canadian Population*. Perceptions 2. Study on Population and Technology. Science Council of Canada. Ottawa, Ontario.

Barlowe, R. 1972. *Land Resource Economics: The Economics of Real Property*, 2nd ed. Prentice-Hall, Inc. Englewood Cliffs, N.J.

Beattie, K.G., W.K. Bond, and E.W. Manning. 1981. *The Agricultural Use of Marginal Lands: A Review and Bibliography*. Working Paper No. 13. Lands Directorate, Environment Canada. Ottawa, Ontario.

Beaubien, C. and R. Tabacnik. 1977. *People and Agricultural Land*. Perceptions 4. Study on Population, Technology and Resources. Science Council of Canada. Ottawa, Ontario.

Beaver Valley Planning Board. 1973. *Official Plan of the Beaver Valley Planning Area*.

Bentley, C.F., *et al*. 1979. "Soils." Prepared for the Conference "Agricultural Production: Research and Development Strategies for the 1980's," Bonn, October 8-12, 1979.

————. 1981a. *Agricultural Land and Canada's Future*. The 1980-81 Klinck Lecture, prepared for the Agricultural Institute of Canada.

————. 1981b. *Agricultural Land Degradation Summation and Perspective*. Alberta Soil Science Workshop. ASFTL, Alberta Agriculture. Edmonton, Alberta.

Bergevin, J. 1965. "Gaspé: A Case Study." Presented at the Seventh Annual Conference of the Institute of Public Administration of Canada. Winnipeg, Manitoba.

Bentin, O. 1981. "A Cattleman Faces a Stark Choice: Change his Business or Lose It," *Globe and Mail*, No. 4,525, 9 Nov. 1981, Sec. 2, p. 16, col. 2.

Boal, F.W. 1970. "Urban Growth and Land Value Patterns: Government Influences," *The Professional Geographer*, Vol. 22, No. 2, 79-82.

Bollman, R.D. 1978. *Selected Annotated Bibliography of Research on Part-time Farming in Canada*. Agriculture Canada. Economics Branch. Ottawa, Ontario.

————. 1979. "Exit, Entry and Structural Change of Census-farm Operators, 1966-1971-1976: Results from the 1966-1971-1976 Census of Agriculture Match," *Farm Net Income: Preliminary 1979*. Catalogue 21-202P. Statistics Canada. Ottawa, Ontario.

————. 1980. "The Phenomenon of Part-time Farming: An Overview," *Agrologist*, Vol. 9, No. 3, 11-13.

————. and A.D. Steeves. 1980. *The Stocks and Flows of Canadian Census Farm Operators over the Period 1966-1976*. Departmental Working Paper 80-4. Carleton University. Department of Sociology and Anthropology. Ottawa, Ontario.

Boote, D. 1981. "Crops to Concrete: Farmland Loss in Alberta," *Planning Profile Newsletter*. Southeast Alberta Regional Planning Commission. February, 1981. 9-12.

Bourne, L.S. 1971. *Internal Structure of the City: Readings on Space and Environment*. Oxford University Press. New York, New York.

Bourne, L.S. and R.D. Mackinnon, eds. 1972. *Urban Systems in Central Canada: Selected Papers*. University of Toronto Press. Toronto, Ontario.

Bowman, I., ed. 1937. *Limits for Land Settlement: A Report on Present-Day Possibilities*. Libraries Press. Freeport, N.Y.

Braden, D.M. 1975. *Planning for Agricultural Resources in Southern Ontario*. M.Sc. (Regional Planning). University of Toronto. Toronto, Ontario.

Bray, C.E. 1979. *Canadian Land Use*. Foreign Agricultural Economic Report No. 155. Economics, Statistics and Cooperatives Service. United States, Department of Agriculture. Washington, D.C.

Brinkman, G.L. and D.J. Blackburn. 1980 "Full-time versus Part-time: Government Programs and Policy," *Agrologist*, Vol. 9, No. 3, 14-17.

British Columbia. Environment and Land Use Committee Secretariat. 1976. "Agricultural Land Capability in British Columbia." Prepared for the British Columbia Department of Agriculture and the Canada Department of Regional and Economic Expansion. Victoria, B.C.

————. Ministry of Agriculture. 1978. *Agriculture in the Peace River*. Publication 78-10.

Brooksbank, R.D. 1976. *Agricultural Land Resources and Land-Use Change in an Urbanizing Region*. M.Sc. (Agriculture Economics). University of Guelph. Guelph, Ontario.

Brown, L.A. and E.G. Moore. 1970. "The Intra-urban Migration Process: A Perspective." In *Internal Structure of the City: Readings on Space and Environment*, ed. L.S. Bourne. Oxford University Press. New York, New York. 1971.

Bruce County Planning Board. 1980. *Official Plan of the Bruce County South Planning Area*.

Bryant, C.R. 1976. "Some New Perspectives on Agricultural Land Use in the Rural-Urban Fringe," *Ontario Geography*, No. 10, 64-78.

————. 1981. "Agriculture in an Urbanizing Environment: A Case Study from the Paris Region, 1968-1976," *Canadian Geographer*, Vol. 25, No. 1, 27-45.

Bumpus, G. 1977. "Land Cheap, Mounties Plentiful," *Harrowsmith*, Vol. II, No. 2, 30-35.

Bureau d'amenagement de l'est du Québec. (n.d.) *Summary of the BAEQ Report*.

Bureau of Municipal Research. 1977. *Food for the Cities: Disappearing Farmland and Provincial Land Policy*.

Canada. Agricultural Rehabilitation and Economic Expansion. 1969. *Farm Englargement and Consolidation Extension*.

————. Department of Regional and Economic Expansion. Ontario Region. 1976. *A Review of ARDA in Ontario: 1962-1975*. Prepared by Charles Singer. Toronto, Ontario.

————. The Tariff Board. 1977. *Fresh and Processed Fruits and Vegetables*. Hull, Quebec.

————. The Tariff Board. 1978. *Fresh and Processed Fruits and Vegetables*, Vol. 2. "Processed Fruits and Vegetables." Catalogue No. FT4-152/2-1. "Processed Fruits and Vegetables Statistical Tables." Catalogue No. FT4-152/2-2. Hull, Quebec.

Canadian Horticultural Council. 1980. *Report of the Committee on Horticultural Research: 1980*.

————. 1981. *Annual Meeting Reports: 1981*.

Cavanagh, L. 1976. *Planning for the Preservation of Agricultural Land*. M.Sc. (Regional Planning). University of Toronto. Toronto, Ontario.

Centre for Resources Development. 1972. *Planning for Agriculture in Southern Ontario*. ARDA Report No. 7. University of Guelph. Guelph, Ontario.

————. 1975. *Studies in Rural Adjustment*. Report No. 2. Publication No. 75. Department of Geography. University of Guelph. Guelph, Ontario.

————. 1976. *Studies in Rural Adjustment*. Report No. 1. Publication No. 74. Department of Geography. University of Guelph. Guelph, Ontario.

————. 1979a. *Studies in Rural Adjustment*. Report No. 6. Publication No. 90. Department of Geography. University of Guelph. Guelph, Ontaio.

————. 1979b. *Studies in Rural Adjustment*. Report No. 8. Publication No. 91. Department of Geography. University of Guelph. Guelph, Ontario.

Clawson, M. 1971. *Suburban Land Conversion in the United States*. John Hopkins Press. Baltimore.

Clonts, H.A. 1970. "Influence of Urbanization on Land Values at the Urban Periphery," *Land Economics*, Vol. 46, 489-496.

Coffin, R.J. and M.W. Lipsey. 1981. "Moving Back to the Land: An Ecologically Responsible Lifestyle Change," *Environment and Behaviour*, Vol. 13, No. 1, 42-63.

Coleman, D. 1977. *Land Use Survey Saugeen River Valley*. Lands Directorate, Environment Canada, Ontario Region. Burlington, Ontario.

Cooper, T.S. (n.d.) *40 Years of Progress in Agriculture in Grey County*.

Crawford, P. 1978. *Hobby Farming as an Instrument of Rural Development: A Case Study of Osgoode Township, Ontario*. M.Pl. Queen's University. Kingston, Ontario.

Crerar, A.D. 1960. "The Loss of Farmland in the Metropolitan Regions of Canada." In *Resources for Tomorrow*. Supplemental Volume. Ottawa, Ontario.

Crewson, D.M. 1977. *Study of Farmland Loss in Central Ontario: 1951-1971*. M.A. (Geography). McMaster University. Hamilton, Ontario.

Crickmer, R. 1976. *An Investigation of the Role of Physical Factors in the Process of Farmland Abandonment in Nova Scotia, 1953-1974*. M.A. (Geography). University of Waterloo. Waterloo, Ontario.

Curry, J.A. 1978. *Agriculture on the Urban Fringe: An Explanatory Case Study, Kitchener-Waterloo Region, Ontario*. M.A. University of Waterloo. Waterloo, Ontario.

DaSilva, W.M. 1976. *A Comparison of Soil Capability and Agricultural Productivity in Southern Ontario*. M.A. (Geography). University of Western Ontario. London, Ontario.

Davidson, G. 1979. *Land-Use Planning for Agriculture: The Development of Policy in Ontario, 1946-1977*. Ph.D. (Political Science). University of Western Ontario. London, Ontario.

Dawson, J. 1965. *Changes in Agriculture in Canada to 1970*. Staff Study No. 11. Economic Council of Canada. Ottawa, Ontario.

Dewey, R. 1960. "The Rural-Urban Continuum: Real but Relatively Unimportant." In *Perspectives on American Community: A Book of Readings*, ed. R.L. Warren. Rand McNally and Company. Chicago.

Dick, B.R. 1977. *Agricultural Land Loss in New Brunswick*. M.A. University of British Columbia. Vancouver, British Columbia.

Dominion Bureau of Statistics. 1951a. *Agriculture*. Vol. VI, Part I. Ottawa, Ontario.

————. 1951b. *Agriculture*. Vol. VI, Part II. Ottawa, Ontario.

————. 1961a. *Agriculture: Ontario*. Catalogue 96-536. Ottawa, Ontario.

————. 1961b. *Canada Year Book*. Ottawa, Ontario.

————. 1966. *Agriculture: Ontario*. Catalogue 96-607. Ottawa, Ontario.

————. 1967. *Canada Year Book*. Ottawa, Ontario.

Elliot, B. 1974. "The Peace River Area," *Agrologist*, Vol. 3, No. 6, 9-11.

Ellis, R.K. 1978. *Values, Basic Needs, Aspirations and Perceptions of Limited Resource Farmers in Grey and Renfrew Counties, Ontario*. M.Sc. University of Guelph. Guelph, Ontario.

Environment Canada. 1970. *CLI: Objectives, Scope and Organization*. Canada Land Inventory Report No. 1. Lands Directorate. Ottawa, Ontario.

————. 1972. *Soil Capability Classification for Agriculture*. Canada Land Inventory Report No. 2. Lands Directorate. Ottawa, Ontario.

————. 1976. *Land Capability for Agriculture: A Preliminary Report*. Canada Land Inventory Report No. 10. Lands Directorate. Ottawa, Ontario.

————. 1980a. *Agriculture Capability by Province—Census Division Breakdown: P.E.I./N.S./N.B./Que./Ont./Man./Sask./Alta*. Lands Directorate. Land Data and Evaluation Branch. Ottawa, Ontario.

————. 1980b. *Land Use in Canada: Report of the Interdepartmental Task Force on Land-Use Policy*. Lands Directorate. Ottawa, Ontario.

Found, W. 1971. *A Theoretical Approach to Rural Land Use*. Edward Arnold Inc. London.

Framst, Gordon E. 1981. "A Method for Determining Enterprise Land Costs." *Economics Information*. Economics Branch. Ontario Ministry of Agriculture and Food. Toronto, Ontario.

Frankena, M.W. and D.T. Scheffman. 1980. *Economic Analysis of Provincial Land-Use Policies in Ontario*. University of Toronto Press. Toronto, Ontario.

Friedman, J. and J. Miller. 1965. "The Urban Field," *Journal of American Institute of Planners*, Vol. 31, No. 4.

Fuller, A.M. 1975. "The Development of the ARDA Farm Enlargement and Consolidation Program in Ontario, 1966-1975." *Studies in Rural Adjustment*. Report No. 2. Centre for Resources Development. Publication No. 75. Department of Geography. University of Guelph.

Fuller, A.M. and J.A. Mage (eds.). 1976. *Part-time Farming: Problem or Resource in Rural Development*. Proceedings of the First Rural Geography Symposium, June 18-20, 1975. Geo Abstracts. Norwich, England.

Fumalle, M.J. 1975. *Public Policy and the Preservation of Agricultural Land in the Southern Okanagan Valley, British Columbia*. M.A. University of Victoria. Victoria, British Columbia.

Gale, J.E. 1963. "What Makes Farm Real Estate Prices," *Agricultural Finance Review*, Vol. 24 (June).

Gellner, J.A. 1977. *A Farm to Non-Farm Comparison of Rates of Return to Resources in Commercial Agriculture in Ontario, 1971-1974*. M.Sc. University of Guelph. Guelph, Ontario.

Geno, B.J. and L.M. Geno. 1976. *Food Production in the Canadian Environment*. Perceptions 3. Study on Population, Technology and Resources. Science Council of Canada. Ottawa, Ontario.

Gertler, L.O. 1961. *The Impact of Urban Growth on Agricultural Land*. Prepared for the Resources for Tomorrow Conference, Conservation Council of Ontario.

————. and Crowley, R. 1977. *Changing Canadian Cities: The Next 25 Years*. McClelland and Stewart Limited. Toronto, Ontario.

Gierman, D.M. 1977. *Rural to Urban Land Conversion*. Occassional Paper No. 16. Lands Directorate, Fisheries and Environment Canada. Ottawa, Ontario.

————. 1981. *Land Use Classification for Land Use Monitoring*. Working Paper No. 17. Lands Directorate, Environment Canada. Ottawa, Ontario.

————. and J. Lenning. 1980. *Rural to Urban Land Conversion*. Map Folio No. 5. Lands Directorate, Environment Canada. Ottawa, Ontario.

Gilson, J.C. 1980. "The Part-time Farmer: Solution to a Problem?" *Agrologist*, Vol. 9, No. 3, 6-7.

Girt, J.L. 1976. "The Spatial/Temporal Dynamics of Farm Land Change in Southern Ontario: Trends and Projections." *Studies in Rural Adjustment*. Report No. 1. Centre for Resources Development. Publication No. 74. Department of Geography. University of Guelph.

Gray, E.C., and B.E. Prentice. 1981. "Ontario Farmland Prices: Ever Upward or . . ..?" *Highlights of Agricultural Research in Ontario*, Vol. 4, No. 1, 8-10.

Grey County Planning Department. 1981. *Grey/Owen Official Plan 1981*.

Gunn, T.C. 1980. "The Contribution of Part-time Farming: An Atlantic Viewpoint," *Agrologist*, Vol. 9, No. 3, 18-20.

Halstead, R.L. and J. Dumanski. 1981. *A Strategy for Agricultural Land Resource Research for Canada: An Update*. Canada Committee on Land Resource Service. Agriculture Canada. Ottawa, Ontario.

Harker, P.T. 1976. *The Impact of Non-Resident Ownership on Farm Patterns in Egremont and Glenelg Townships: A Case Study for an Area Outside the Community Range of Major Ontario Cities*. M.A. University of Waterloo. Waterloo, Ontario.

Hart, J.F. 1968. "The Loss and Abandonment of Cleared Farmland in the Eastern United Stated," *Annals of the Association of American Geographers*, Vol. 58, 417-440.

Harvey, R.O. and W.A.V. Clark. 1975. "The Nature and Economics of Urban Sprawl," *Land Economics*, Vol. 41, No. 1, 1-9.

Hind-Smith, J. and L. Gertler. 1962. "The Impact of Urban Growth on Agricultural Land." *Resources for Tomorrow*. Supplemental Volume. Ottawa, Ontario.

Hodge, G. 1972. "The Emergence of the Urban Field." In *Urban Systems in Central Canada: Selected Papers*, eds. L.S. Bourne and R.D. MacKinnon. University of Toronto Press. Toronto, Ontario.

Howard, J.F. 1972. *The Impact of Urbanization on the Prime Agricultural Lands of Southern Ontario*. M.A. University of Waterloo. Waterloo, Ontario.

Hull, C.H. and Nie, N.H. 1979. *SPSS Update: New Procedures and Facilities for Releases 7 and 8*. McGraw-Hill Co. New York, New York.

Jarochowska, M. 1980. *Methode de correlation partielle dans l'analyse empirique de rentabilité des fermes peri-urbaines*. Université de Québec et Montréal.

Jones, R.L. 1946. *History of Agriculture in Ontario, 1613-1880*. University of Toronto Press. Toronto, Ontario.

Kelly, F., ed. 1975. *Population Growth and Urban Problems*. Perceptions 1. Study on Population and Technology. Science Council of Canada. Ottawa, Ontario.

Khan, J.R. 1977. *Changing Patterns of Agricultural Land Use in Renfrew County, 1951-1971*. M.A. (Geography). Carleton University. Ottawa, Ontario.

Kraft, D.K. 1981. "Analysis of the Farmland Market in the Prairie Provinces," *Canadian Mortgage Market Review*, Vol. 17, No. 5.

Krueger, R.R. 1970a. "The Disappearing Niagara Fruit Belt." In *Regional and Resource Planning in Canada*, ed. R.R. Krueger. MacMillan Co. Toronto, Ontario.

————. ed. 1970b. *Regional and Resource Planning in Canada*. MacMillan Co. Toronto, Ontario.

————. 1980. "The Geographer and Rural (?) Southern Ontario," *Ontario Geography*, No. 16, 7-32.

Krushelnicki, B.W. 1976. *An Assessment of the Use of Transfer of Development Rights as a Means of Preserving the Niagara Fruit Belt*. M.Pl. Queen's University. Kingston, Ontario.

LaBarre, C. 1968. *The Regional Economic Impact of the Merdochville Mining Complex*. Rural Development Branch. Department of Forestry and Rural Development. Ottawa, Ontario.

Lang, K.M. 1979. "The Gaspé Peninsula: Naturalist Wonderland," *Canadian Geographic*, Vol. 98, No. 1, 36-39.

Layton, R.L. 1976. *Hobby Farming: A Characterization, A Case Study of the Rural-Urban Fringe of London, Ontario*. M.A. University of Western Ontario. London, Ontario.

Leacock, S. 1930. *Economic Prosperity in the British Empire*. Constable and Co. London.

Lentz, G. 1971. "Rural Real Estate Values in Southern Ontario." *Economics Information*. Economics Branch. Ontario Ministry of Agriculture and Food. Toronto, Ontario.

Leuty, S.J., *et al.* 1980. "The Horticulture Industry: Education, Research and Extension Requirements, 1980-2000." Unpublished report.

Lithwick, N.H. and G. Paquet, eds. 1968. *Urban Studies: A Canadian Perspective*. Methuen. Toronto, Ontario.

Lobsinger, I. 1970. *Saugeen Valley Conservation Authority: Twenty Years of Conservation on the Saugeen Watershed, 1950-1970.*

Lovering, J. and D. MacMinn. 1973. *Estimating the Costs of Beef Production*. Publication No. 1506. Agriculture Canada. Ottawa, Ontario.

MacKintosh, W.A. 1934. "Prairie Settlement: The Geographical Setting." *Canadian Frontiers of Settlement*. Vol. I.

————. 1937. "Canada as an Area for Settlement." *Limits for Land Settlement: A Report on Present-Day Possibilities*, ed. I. Bowman. Libraries Press. Freeport, New York.

Mackrandilal, V.L. 1979. *Discriminate Function Analysis of Urban Influence on Agriculture in Southern Ontario*. M.Sc. University of Guelph. Guelph, Ontario.

Mage, J.A. 1974. *Part-time Farming in Southern Ontario, with Special Reference to Waterloo County, Ontario*. Ph.D. University of Waterloo. Waterloo, Ontario.

————. 1979a. "Development of a Scheme of Agricultural Typology for Canadian Conditions." *Studies in Rural Adjustment*. Report No. 8. Centre for Resources Development. Publication No. 91. Department of Geography. University of Guelph.

————. 1979b. "Part-time Farming in Huron County, Ontario: Forms of Adjustment in a Commercial Agricultural Area". *Studies in Rural Adjustment*. Report No. 6. Centre for Resources Development. Publication No. 90. Department of Geography. University of Guelph.

Manning, E.W. 1972. *The Changing Land Use of a Diversified Agricultural Region: The Heretaunga Plains of New Zealand*. Ph.D. (Geography). Victoria University of Wellington. New Zealand.

————. 1979. "The Effects of Zoning and Development Controls on Rural Landowners and Users." Presented to the Canadian Bankers' Association, Farm Credit Conference, Quebec City, October, 1979.

————. and S.S. Eddy. 1978. *The Agricultural Land Reserves of British Columbia: An Impact Analysis*. Land Use in Canada Series, No. 13. Lands Directorate, Environment Canada. Ottawa, Ontario.

————. and J.D. McCuaig. 1977. *Agricultural Land and Urban Centres*. Canada Land Inventory Report No. 11. Lands Directorate, Environment Canada. Ottawa, Ontario.

————. 1979. *The Changing Value of Canada's Farmland: 1961-1976*. Land Use in Canada Series, No. 17. Lands Directorate, Environment Canada. Ottawa, Ontario.

Marshall, K.B. 1974. *Land-Use Change in the Orchard Areas of the Okanagan Valley of British Columbia: A Case Study*. M.BA. University of British Columbia. Vancouver, British Columbia.

Martin, L.R.G. 1975. "An Examination of Land Dealer and Land Developer Behaviour on the Urban Fringe of Canadian Cities." Draft Report for the Lands Directorate, Environment Canada.

McCormack, R.J. 1975. "Demands for Land in Canada." *Agricultural Land Use in Canada*. Canadian Agricultural Economics Society.

McCuaig, J.D. 1976. "Land Speculation: A Review and Approach to Identification." Draft Report for the Lands Directorate, Environment Canada. Ottawa, Ontario.

McLean, J.R. 1977. *Land Capability as a Determinant of Agricultural Productivity*. M.Sc. (Geography). University of Guelph. Guelph, Ontario.

McRae, J.D. 1977. *Recent Changes in Land Ownership and Implications of Land Use: A Case Study in Eastern Ontario*. M.A. University of Guelph. Guelph, Ontario.

————. 1980. *The Influence of Exurbanite Settlement on Rural Areas: A Review of Canadian Literature*. Working Paper No. 3. Lands Directorate, Environment Canada. Ottawa, Ontario.

————. 1981. "Exurbanite Settlement in Rural Areas: A Case Study in the Montreal-Ottawa Urban Shadow." Land Use in Canada Series, No. 24. Lands Directorate, Environment Canada. Ottawa, Ontario.

Morton-Gittens, K.E. 1977. *An Analysis of Economic and Family Viability of Limited Resource Farmers Unreceptive to Farm Improvements*. M.Sc. University of Guelph. Guelph, Ontario.

Myrdal, G. 1957. *Economic Theory and Underdeveloped Regions*. London University Press. London.

Neimanis, V.P. 1979. *Canada's Cities and Their Surrounding Land Resource*. Canada Land Inventory Report No. 15. Lands Directorate, Environment Canada. Ottawa, Ontario.

———— and R. McKechnie. 1980. *Urban Growth, Infrastructure, and Land Capability: A Windsor Example*. Land Use in Canada Series, No. 19. Lands Directorate, Environment Canada. Ottawa, Ontario.

Nelson, H. 1923. "The Interior Colonization of Canada at the Present Day, and Its Natural Conditions," *Geographiska Annaler*, Vol. 5, 244-308.

Nelson, J.B. and D. Nicholson. 1960. *Ontario's Shrinking Farmlands*. Department of Agriculture and Food, Farm Economics and Statistics Branch. Toronto, Ontario.

Nie, N.H., *et al*. 1975. *SPSS: Statistical Package for the Social Sciences*, 2nd ed. McGraw Hill, Inc. New York, New York.

Noble, H.F. 1962. "Trends in Farm Abandonment," *Canadian Journal of Agricultural Economics*, Vol. 10, 60-77.

————. 1974. *Changes in Acreage of Census Farms in Ontario, 1941-1971 by Census Subdivisions*. Ontario. Ministry of Agriculture and Food, Economics Branch. Toronto, Ontario.

Okafor, F.C. 1975. *Intensity of Agricultural Land Use in Canada: Von Thünen's Model Extended*. M.Sc. University of Western Ontario. London, Ontario.

Ola, T. 1975. *Agricultural Policy in Alberta: A Study on Some Aspects of Consistency in Policy*. M.Sc. University of Alberta. Edmonton, Alberta.

Ontario. Energy and Agriculture Policy Committee. 1981. *Energy and Agriculture*. Vol. I, *Summary and Recommendations*. Toronto, Ontario.

Ontario. Department of Agriculture. 1957. "Factors Affecting Land Use in a Selected Area in Southern Ontario." Land Use and Geographic Survey of Louth Township in Lincoln County.

Ontario. Department of Planning and Development. 1952. *Saugeen Valley Conservation Report, 1952*.

Ontario. Ministry of Agriculture and Food. 1976. *Agricultural Code of Practice*.

————. 1978. *Food Land Guidelines: A Policy Statement of the Government of Ontario on Planning for Agriculture*.

Ontario Niagara Escarpment Commission. 1979. *The Proposed Plan for the Niagara Escarpment*.

Ontario. Royal Commission on Electric Power Planning. 1980. *The Socio-Economic and Land-Use Impacts of Electric Power in Ontario*, Vol. 7. Toronto, Ontario.

Parsons, D.L. 1975. *The Influence of Type of Owner on Farm Management in Chinguacousy Township, Ontario*. M.A. (Geography). York University. Toronto, Ontario.

Pemberton, C.A.R. 1976. *Goals and Aspirations and the Low-Income Farm Problem*. Ph.D. University of Manitoba. Winnipeg, Manitoba.

Pennance, F.G. 1974. *Housing, Town Planning and the Land Commission*. Institute of Economic Affairs. London.

Purvis, J.M. and H.F. Noble. 1973. *A Socio-Economic Study of New Farm Operators in Eastern Ontario*. Ontario. Ministry of Agriculture and Food. Toronto, Ontario.

Real Estate Research Corporation. 1974a. *The Costs of Sprawl: Detailed Cost Analysis*. United States Government Printing Office. Washington, D.C.

————. 1974b. *The Costs of Sprawl: Literature Review and Bibliography*. United States Government Printing Office. Washington, D.C.

Reaman, G.L. 1970. *A History of Agriculture in Ontario*, 2 Vols. Hazell, Watson and Viney Ltd. Aylesbury, England.

Reeves, C.M. 1974. *The Establishment of the Kelowna Orcharding Area, British Columbia: A Study of Accommodation to Site and Situation*. M.A. (Geography). University of British Columbia. Vancouver, British Columbia.

Regional Municipality of Waterloo. Department of Planning and Development. 1981. *A Review of Agricultural Trends and Policies*. Regional Planning and Development Series. Publication No. 6.

Richards, J.H. 1954. *The Renfrew Region of the Middle Ottawa Valley*. M.A. Clark University. Worchester, Mass.

Ricour-Singh, F. 1981. "The Urban-Rural and Farm-Non-Farm Dichotomies: Are They Obsolete?" *Canadian Statistical Review*, Catalogue 11-003E, Vol. 56, No. 2, vi-x. Statistics Canada. Ottawa, Ontario.

Rodd, R.S. 1976. "The Use and Abuse of Rural Land," *Urban Forum*, Vol. 2, No. 3, 5-12.

Rogers, A.W., ed. 1978. *Urban Growth, Farmland Losses and Planning*. A Symposium Organized by the Rural Geography Study Group of the Institute of British Geographers.

Runka, G.G. 1980. "Overview: Planning for Rural Land," *In Search of Place: Planning for Small Communities*. Proceedings of the 1980 CIP/ICU National Conference, 22-26 June, 1980. Kitchener, Ontario.

Russell, L. 1978. *The Evolution of Planning Policies for Agricultural Land Loss in the Niagara Region, Ontario*. M.Pl. Queen's University. Kingston, Ontario.

Russwurm, L.H. 1967. "Expanding Urbanization and Selected Agricultural Elements: Case Study, Southwestern Ontario Area, 1941-1961," *Land Economics*, Vol. 43, 101-107.

————. 1974. *The Urban Fringe in Canada: Problems, Research Needs, Policy Implications*. Discussion Paper B.74.4. Ministry of State for Urban Affairs. Ottawa, Ontario.

————. 1975. *The Urban Fringe as a Regional Environment*. University of Waterloo. Department of Geography. Waterloo, Ontario.

Schmid, A.A. 1968. *Converting Land from Rural to Urban Uses*. Resources for the Future, Inc. John Hopkins Press. Baltimore.

Shewfelt, D.G. 1968. *An Empirical Analysis of Farmland Price in Ontario, 1972-1974*. M.A. University of Guelph. Guelph, Ontario.

Simpson-Lewis, W., *et al*. 1979. *Canada's Special Resource Lands: A National Perspective of Selected Land Uses*. Map Folio No. 4. Lands Directorate, Environment Canada. Ottawa, Ontario.

Sinclair, R. 1967. "Von Thünen and Urban Sprawl," *Annals of the Association of American Geographers*, Vol. 47, 72-87.

Smit, B.E. 1977. *A Regional Analysis of Employment Changes in Canadian Agriculture*. Ph.D. (Geography). McMaster University. Hamilton, Ontario.

Sorbee, M.M. 1974. *Economics of Grain-Beef Cattle Operations in the Lloydminister-Battleford District of Saskatchewan*. Department of Agriculture. Economics Branch Publication 74/14.

————. 1976. *Farm Business Summary, Saskatchewan-Manitoba, 1975*. Department of Agriculture Publication 76/18.

Spurr, P. 1976. *Land and Urban Development: A Preliminary Study*. James Lorimer & Company. Toronto, Ontario.

Statistics Canada. 1971a. *Agriculture: Ontario*. Catalogue 96-707. Ottawa, Ontario.

————. 1971b. *Dwelling Characteristics by Structural Type and Tenure*. Catalogue 93-738. Ottawa, Ontario.

————. 1973a. *Population: Census Divisions (Historical)*. Catalogue 92-702. Vol. I, Part I. Ottawa, Ontario.

————. 1973b. *Population: Urban and Rural Distributions*. Catalogue 92-709. Vol. I, Part I. Ottawa, Ontario.

————. 1976a. *Index of Farm Production*. Catalogue 21-203. Ottawa, Ontario.

————. 1976b. *Profile Studies: The Urban and Rural Composition of Canada's Population*. Catalogue 99-702. Ottawa, Ontario.

————. 1978. *Canada Year Book*. Ottawa, Ontario.

————. 1980a. *Canada Year Book*. Ottawa, Ontario.

————. 1980b. *The Consumer Price Index*. Catalogue 62-001. Ottawa, Ontario.

————. 1980c. *Farm Input Price Index*. Catalogue 62-004. Ottawa, Ontario.

————. 1980d. *Index Numbers of Farm Prices of Agricultural Products*. Catalogue 62-003. Ottawa, Ontario.

————. 1981a. *Canadian Statistical Review*, Catalogue 11-003E, Vol. 56, No. 2, vi-x. Ottawa, Ontario.

————. 1981b. *Farm Net Income*. Catalogue 21-202. Ottawa, Ontario.

Study Committee on the Protection of Agricultural Land. 1981. *National Agricultural Lands Study: Final Report*. United States Government Printing Office. Washington, D.C.

Stock, G.E. 1975. *The Geography of Small-Scale Farming in Ontario*. M.A. (Geography). University of Guelph. Guelph, Ontario.

Stringer, T.M. 1977. *Participation Patterns and Policy References of Limited Resource Farmers*. M.Sc. University of Guelph. Guelph, Ontario.

Task Force on the Orientation of Canadian Agriculture. 1977. *Orientation of Canadian Agriculture: A Task Force Report*. Vol. I, Part A, "A Review of the Canadian Agriculture and Food Complex: The System." Vol. I, Part B, "A Review of the Canadian Agriculture and Food Complex: The Commodities." Vol. II, "Domestic Policies and External Factors Which have Influenced the Development of Canadian Agriculture." Vol. III, "Economic and Social Factors Related to Agriculture and Food." Agriculture Canada. Ottawa, Ontario.

Thompson, E. 1980. *Farming in the Shadow of Suburbia: Case Studies in Agricultural Land-Use Conflict*. National Association of Counties Research Foundation. Washington, D.C.

Tosine, T.P. 1979. *An Overview of Land Use in Central Canada*. Economics Branch. Ontario. Ministry of Agriculture and Food. Toronto, Ontario.

Trant, M.J. 1976. *Classification of Limited Resource Farmers in Ontario Based on Behavioural and Economic Characteristics*. M.Sc. University of Guelph. Guelph, Ontario.

————. 1980. "Part-time Farmers: Who Are They?" *Agrologist*, Vo1. 9, No. 3, 8-11.

Troughton, M.J. 1975. "Agriculture and the Countryside." In *The Countryside in Ontario*, eds. M.J. Troughton, J.G. Nelson and S. Brown. Department of Geography. University of Western Ontario. London, Ontario.

————. 1976. "A Model for Rural Settlement in Canada," *General Economic Geography*, Vol. 6, 339-343.

————. 1978. "The Rural Urban Fringe: Land Use Characteristics and Resource Management Challenges," *Urban Forum*, Vol. 3, No. 5, 8-14 and 27.

————. J.G. Nelson and S. Brown. 1975. *The Countryside in Ontario*. Department of Geography. University of Western Ontario. London, Ontario.

Vander Pluym, H.S.A., *et al*. 1981. *Degradation by Salinization*. Alberta Soil Science Workshop. ASFTL, Alberta Agriculture. Edmonton, Alberta.

Vinning, G.S. 1979. *Regulation and Regulatory Modes in Canadian Agriculture*. M.A. Carleton University. Ottawa, Ontario.

Vuuren, W.V. 1972. *Problems of Change in Rural Land Use in Southern Ontario*. Publication No. 58. Centre for Resources Development. University of Guelph. Guelph, Ontario.

Warkentin, J., ed. 1968. *Canada: A Geographical Interpretation*. Meuthuen. Toronto, Ontario.

Warren, C.L. and P.C. Rump. 1981. *The Urbanization of Rural Land in Canada: 1966-1971 and 1971-1976*. Land Use in Canada Series, No. 20. Lands Directorate, Environment Canada. Ottawa, Ontario.

Warren, R.L., ed. 1960. *Perspectives on American Community: A Book of Readings*. Rand McNally and Company. Chicago.

Watt, W.J. 1974. *Marginal Capability Lands of the Chilcotin, British Columbia*. M.Sc. University of British Columbia. Vancouver, British Columbia.

Weir, T.R. 1968. "The People." In *Canada: A Geographical Interpretation*, ed. J. Warkentin. Meuthuen. Toronto, Ontario.

Williams, G.D.V. 1975. "An Agroclimatic Resource Index for Canada and Its Use in Describing Agricultural Land Losses." Prepared for the Science Council of Canada. Agriculture Canada. Ottawa, Ontario.

Wolpert, J. 1965. "Behavioural Aspects of the Decision to Migrate." *Papers and Proceedings: Regional Science Association*. Vol. 15, 159-169.

————. 1966. "Migration as an Adjustment to Environmental Stress," *Journal of Social Issues*, Vol. 22, 92-102.

Wood, H.A. 1973. *Absentee Rural Land Ownership in Medonte Township, Ontario*. Department of Geography, McMaster University. Hamilton, Ontario.

Zanyk, J.N. 1979. *Land Tenure and the Intensity of Agricultural Land Use in a Rural-Urban Fringe*. B.A. (Geography). University of Western Ontario. London, Ontario.

THE LAND USE IN CANADA SERIES

(Incorporating ***Land Use Programs in Canada***)

No.

1. ***Land Use Programs in Canada: Nova Scotia***. Valerie Cranmer, 1974. EN 73-1/1.
2. ***Land Use Programs in Canada: New Brunswick***. Valerie Cranmer, 1974. EN 73-1/2.
3. ***Land Use Programs in Canada: Prince Edward Island***. Valerie Cranmer, 1974. EN 73-1/3.
4. ***Land Use Programs in Canada: Quebec***. Odette L'Anglais, 1976. EN 73-1/4.
5. ***Land Use Programs in Canada: Alberta***. E. Neville Ward, 1975. EN 73-1/5.
6. ***Land Use Programs in Canada: Newfoundland***. Valerie Cranmer, 1974. EN 73-1/6.
7. ***Land Use Programs in Canada: British Columbia***. E. Neville Ward, 1976. EN 73-1/7.
8. ***Land Use Programs in Canada: Manitoba***. E. Neville Ward, 1976. EN 73-1/8.
9. ***Land Use Programs in Canada: Ontario***. E. Neville Ward, 1978. EN 73-1/9.
10. ***Land Use Programs in Canada: Saskatchewan***. E. Neville Ward, 1978. EN 73-1/10.
11. ***Federal Lands: Their Use and Management***. Hedley M. Swan, 1978. EN 73-1/11.
12. ***Non-Resident Land Ownership Legislation and Administration in Prince Edward Island***. P.E.I. Land Use Service Centre and the Maritime Resource Management Service, Council of Maritime Premiers, 1978. EN 73-1/12.
13. ***The Agricultural Land Reserves of British Columbia***: An Impact Analysis. Edward W. Manning and Sandra S. Eddy, 1978. EN 73-1/13. $3.50
14. ***Land Use Programs in Canada: Northwest Territories***. T. Fenge, J.E. Gardner, J. King and B. Wilson, 1979. EN 73-1/14. $3.00
15. ***Land Use Programs in Canada: Yukon Territory***. D.K. Redpath, 1979. EN 73-1/15. $3.00
16. ***Prince Edward Island Land Development Corporation—Activities and Impact 1970-1977***. Maritime Resource Management Service and Council of Maritime Premiers. 1979. EN 3-1/16.

17. ***The Changing Value of Canada's Farmland***: 1961-1976. (Bilingual). E.W. Manning, J.D. McCuaig and E. A. Lacoste, 1979. EN 73-1/17.
18. ***The Land Use Impacts of Recent Legislation in P.E.I.*** E. Kienholz, 1980. EN 73-1/18E.
19. ***Urban Growth, Infrastructure, and Land Capability: A Windsor Example***, V. Neimanis and R. McKecknie, 1980. EN 73-1/19E.
20. ***Urbanisation of Rural Lands in Canada:*** 1966-1971 and 1971-1976. C. Leigh Warren and Paul C. Rump, 1981. EN 73-1/20.

FIGURE 4-5

LAND USE IN THE SAUGEEN VALLEY, 1976

UTILISATION DES TERRES DANS LA VALLÉE SAUGEEN, 1976

SCALE ÉCHELLE

KILOMETRES 2 1 0 2 4 6 8 10 KILOMETRES

SOURCE:

CANADA LAND USE DATA SYSTEMS SYSTÈMES DE DONNÉES DIRECTION GÉNÉRALE DES TERRES

LAKE HURON

LAC HURON

Southampton
Port Elgin
Tara
Paisley
Chatsley
Hanover
Durham
Markdale
Owen Sound
Kincardine
Walkerton
Neustadt
Elmwood
Clifford
Mount Forest
Harriston
Tiverton

KEY MAP CARTE PRINCIPALE

AMABEL, SAUBLE, ARRAN, BRUCE, ELDERSLIE, KINCARDINE, HURON, KINLOSS, ASHFIELD, CULROSS, TURNBERRY, DERBY, SYDENHAM, SULLIVAN, HOLLAND, EUPHRASIA, GREY, BENTINCK, GLENELG, ARTEMESIA, BROOKE, NORMANBY, EGREMONT, PROTON, CARRICK, HOWICK, MINTO, ARTHUR, WEST LUTHER, MOUNT FOREST

SCALE ÉCHELLE

10 0 10 20 30

KILOMETRES KILOMETRES

LEGEND LÉGENDE

- CROPS / RÉCOLTES
- PASTURE / PÂTURAGE
- FORESTRY / FORÊTS
- SCRUB / BROUSSE
- URBAN / URBAIN
- RECREATION & PARKS / RÉCRÉATION & PARCS
- EXTRACTIVE / EXTRACTION
- COTTAGES / CHALETS
- MIXED USE / UTILISATION MIXTE
- WATER / EAU
- BRUCE NUCLEAR STATION / STATION NUCLÉAIRE BRUCE